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# WEATHER AT THE NAVAL WEAPONS CENTER 1946-1968

by

D. L. Farnham and I. C. Vercy  
Systems Development Department

ABSTRACT. This report, which supersedes NOTS TP 3673, summarizes surface and upper-air climatological data taken at the Naval Weapons Center, China Lake, California, from 1946 through 1968.

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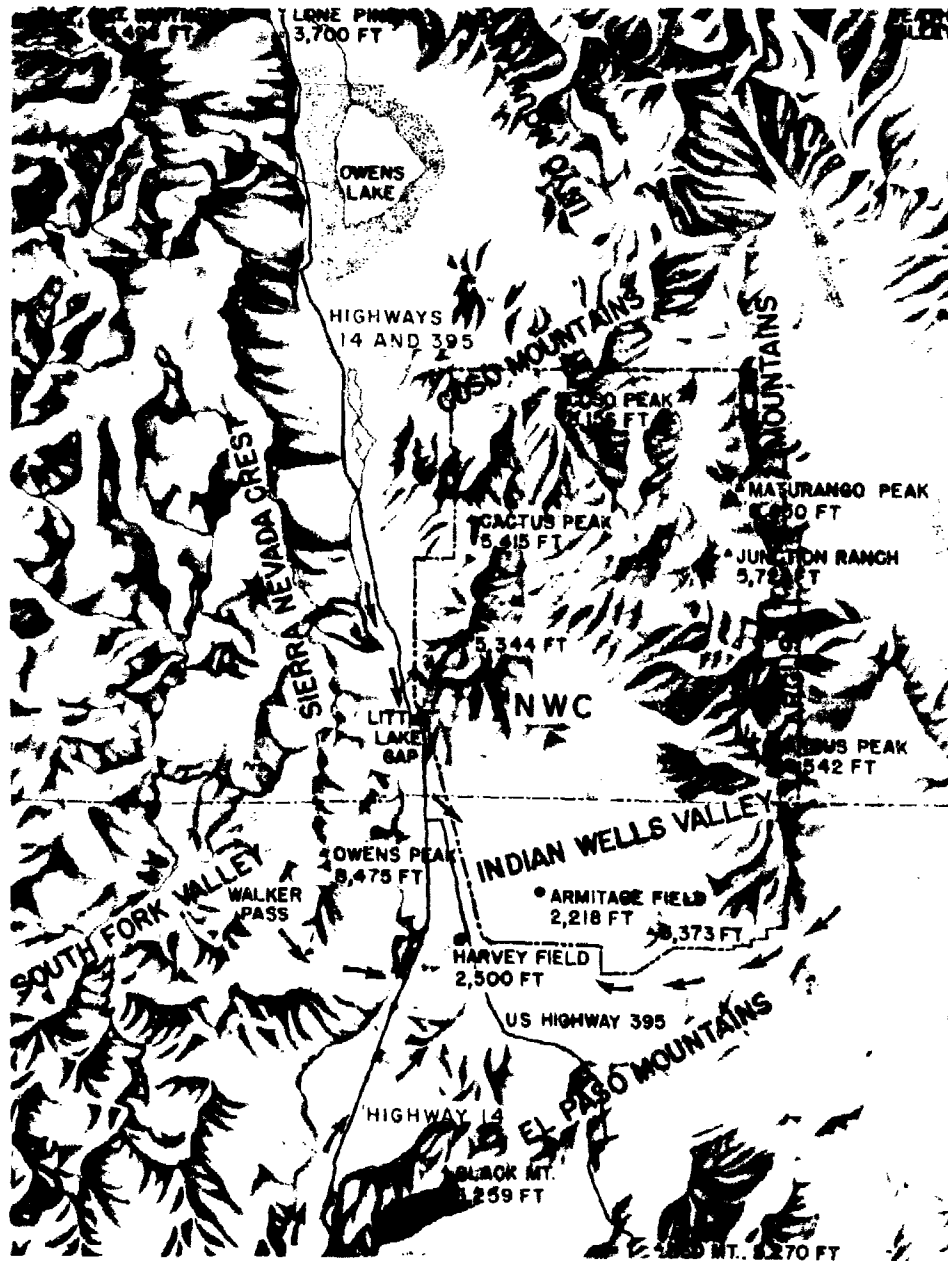
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Topographic Map of NWC and the Surrounding Area.

## INTRODUCTION.

Complete weather records have been kept at NWC, China Lake, for the past 23 years. These records show the Center to have a typical desert climate, with a moderate seasonal and large diurnal temperature range, low humidity, light and variable precipitation, and little cloudiness or visibility restriction. When of significant speed, winds are usually steady in direction. Wind speeds usually vary according to thermal conditions. The strongest gusts ordinarily occur with frontal passages.

Details supporting this analysis are given on the following pages. Most of the earlier surface weather data were collected by the Navy Weather Service at Armitage Field; however, they are now taken at the Instrumentation Laboratory, G-1 Range. Upper-air data were gathered at Tower 8, G-1 Range, with GMD-1 rawin equipment.

Weather facilities and services at NWC are described in Ref. 1; detailed descriptions and analyses of miscellaneous atmospheric phenomena occurring in the Center area are given in Ref. 2-21.

## GEOGRAPHIC AND TOPOGRAPHIC FACTORS

The Naval Weapons Center is located at latitude 35°41'N and longitude 117°41'W, at an altitude of 2,215 feet above mean sea level. The Center, situated in the interior of south-central California, lies on the northern edge of the Mojave Desert. To the west and northwest are the Sierra Nevada mountains, with peaks rising to heights above 6,000 feet west of the Center, and with Mount Whitney (and other peaks 75 miles northwest) exceeding 14,000 feet in altitude. The northern boundary of the Center is the Coso Range, extending above 8,000 feet. Northeast to east is the Argus Range with elevations above 6,000 feet, and farther to the east are the Slate and Panamint Ranges, with peaks exceeding 11,000 feet in elevation. South is the El Paso Range with heights above 5,000 feet. The terrain on which the NWC administration complex and test-ranges are located is nearly level throughout an area

extending north-south for 30 miles and east-west for 15 miles. The floor of the valley is desert, and consists of sandy soil, with a large dry-lake bed.

Airflow into the valley at low levels is through four main passes in the surrounding mountains. The prevailing flow is through Walker Pass and Tehachapi Pass, southwest of the Center. Air from the north must come through Little Lake Gap, to the north-northwest. The other pass is southeast of the Center, separating the Argus and El Paso Mountains.

#### SURFACE CLIMATOLOGICAL DATA

A complete record of meteorological data for the Center has been maintained since January 1946, with the observations first being taken at Armitage Field by the Navy Weather Service. Temperatures since November 1959, winds since April 1963, pressure, humidity, and precipitation since December 1964, have been observed by the Atmospheric Studies Branch at the Instrumentation Laboratory, G-1 Range, because of changes in the location of instruments at Armitage Field and in the schedule of observation times. Although observations were first begun at Armitage Field in June 1945, they did not cover a 24-hour daily period. Data prior to that time are also available, but the observations were taken at Harvey Field, about 10 miles west of the Center, and have been found to be unrepresentative of the Center area, especially the data for wind and precipitation. Table 1 summarizes the surface weather measurements recorded from 1946 through 1968.

Pressure. As shown in Fig. 1, the mean monthly trend is from a minimum of 931.4 mb in June to a maximum of 939.9 mb in December. The Center yearly average barometric pressure is 935.5 mb (see Table 1). The mean monthly extreme range is from 923.3 mb in April to 952.9 mb in December. Recorded extremes of barometric pressure in this locale are a minimum of 915.8 mb, occurring on 1 March 1952, and a maximum of 959.9 mb, occurring on 22 December 1967. A thermal low-pressure center exists in or near the Center area during the summer months. Lower temperatures combined with the frequent occurrences of the nearby Great Basin high-pressure cell result in higher pressures during the winter. The summer minimum in June (rather than in July or August--the months of highest mean temperature) is probably caused by increasing temperature and the more frequent passage of frontal troughs or low-pressure centers.

Temperature and Radiation. The location and topography of the Center combine to make its climate one of moderate seasonal and large diurnal temperature ranges. Mean and extreme monthly temperature ranges are shown in Fig. 2.

The extreme maximum temperature of 114°F for the period of record was observed on 22 June 1954 and on 20 and 21 June 1961. An extreme minimum of 0°F was recorded on 13 January 1963. Average monthly mean temperatures and extremes are shown in Fig. 3, with the mean ranging from 43°F in January to 86°F in July. The slight heat lag is to be expected in a desert locale.

The prevailing scant cloudiness and low humidity allow a large amount of solar and sky radiation, as shown in Table 2. A steady radiation increase occurs from December to June, in direct proportion to the increase in angular elevation of the sun. In contrast, the data for Riverside, California, taken from the Monthly Weather Review and covering a period of only one year, show a radiation decline from April to May, probably due to increased cloudiness in that area.

The same factors that permit high insolation result in rapid cooling by radiation at night, giving low minimum temperatures and large diurnal temperature ranges. There is also some mountain-valley drainage of cool air. The greatest daily range of 54°F occurred in March. The mean daily range by months varies from 29°F to 33°F.

The seasonal extremes of hot and cold weather are shown in Fig. 4, which gives the number of degree days for each month, the number of days per month on which the maximum temperature was 100°F or above, and the number of days per month on which the minimum temperature was 32°F or less. A 'degree day' has the usual meaning; i.e., the mean daily temperature is less than 65°F, and the value for a given day equals the difference between the mean temperature and 65°F. The monthly totals indicate the amount of artificial heating required.

Precipitation. Precipitation in the Center area is seasonal. Negligible amounts of rainfall occur, from April through October, and there is the winter maximum to be expected in a location near a region having a Mediterranean-type climate. Table 3 shows annual and monthly precipitation on a calendar-year basis, together with snowfall amounts. Fig. 5 presents the yearly totals graphically. Table 4 gives monthly and yearly amounts on a July through June 'rainfall-year' basis, which appears to be more representative of actual conditions. The large variation typical of the desert, from 0.78 inch in 1964 to 9.13 inches

in 1965, is somewhat smoothed in the 'rainfall-year' tabulation, from 3.18 to 6.91 inches. The average for the calendar-year over the period is 2.76 inches and 2.80 inches for the 'rainfall-year'. The difference is because of the slight variation in the periods covered.

Precipitation over the valley area of the Center is usually in the form of rain, with snow at the higher levels during the winter. One or two days of snow flurries normally occur each winter, but during the period of 11-14 January 1949, snow fell over the entire area, reaching depths of 12 to 14 inches over the southern portion of the Center (Ref. 12), and 5 to 6 inches fell in January 1962.

Rain during the winter months usually results from either closed low-pressure centers aloft or strong frontal wave systems, especially from the southwest. Either condition results in rain for periods of one to three days. Precipitation during the other months is usually in the form of rain showers, with an occasional thundershower. Light hail may occur during a thundershower. On 8 June 1948, hail, one-fourth to one-half inch in diameter, fell in sufficient quantities to cover the ground (Ref. 2).

Relative Humidity. Except during periods of precipitation, the relative humidity is consistently low, with the monthly mean ranging from 23% in July to 52% in December. During the hours of maximum summer heating, the humidity often drops below 10%. The low summer humidity, of course, markedly alleviates the sensible temperature. The trend of monthly humidity through the year is shown in Fig. 6.

Wind. As shown in Table 1, the prevailing wind direction remains SW throughout the year, with average speed by months varying from a minimum of 6 mph, November through January, to a maximum of 10 mph, March through June. A peak gust of 81 mph, west, on 19 March 1952 has been observed.

An analysis of the Summary of Monthly Aerological Records for Armitage Field (Ref. 20), covering the period November 1949 to October 1964 and showing the hourly frequency of wind direction by months, confirms that the prevailing direction is S to SW, but with a definite seasonal variation during the daylight hours. From June through September, the thermal effect is naturally strong. Relatively stronger heating during morning hours on the mountain slopes west of the Center appears to cause a thermal low in that area and a temporary SE flow. The direction is E to SE from mid-morning through noon, becoming S to SW thereafter as the valley is heated. During fall and winter, October through February, the decrease in heating and the frequent occurrence

of the Great Basin High northeast and east of the Center result in a nearly equal frequency of E to SE and S to SW winds. In spring, March through May, the decreasing occurrence of the Great Basin High, the continued west-to-east frontal passages, and the increasing SW winds aloft cause the surface winds to be S to SW during 80% of the daylight hours.

Highest peak-wind speeds occur in the months of December through April because of the more frequent frontal passages and stronger winds aloft. The increase in average monthly wind speeds after January results from a combination of frontal activity with increased heating. Through the day, speeds tend to increase with the heating, and lessen after sundown. Pronounced drainage of cooling air down from the mountains, however, may occasionally cause relatively high speeds throughout the night. Particularly strong convection occurring with thunderheads during the summer may cause gusts of 40 mph or more.

Visibility. The main restriction to visibility is blowing sand or dust, which occurs on an average of 8 days per year, mostly during the winter and spring months when average and peak wind speeds are highest. However, since standards for meteorological observations call for the reporting of restrictions to visibility only when visibility is less than 7 miles throughout one-half or more of the horizon, local conditions of visibility may be worse than those reported. Usually, wind speeds of 35-40 mph cause blowing dust, although a somewhat lesser wind speed results in blowing dust if the direction is N or NNW. In the latter case, fine alkali dust from around Owens Lake is carried through Little Lake Gap and causes especially low visibility in the northern and northwestern areas of the Center ranges. The frequency of blowing dust has gradually decreased at the Center over the years, perhaps because of a decrease in construction on the Center and because the most traveled roads have been hard-surfaced. For example, reference 2, covering the period 1945-48, reports blowing dust on an average of 20 days per year.

Haze is common throughout the year, partly because of the large amount of dust and salt nuclei, and may reduce visibility to less than 5 miles, especially over the G-ranges and when humidity is temporarily high. Prolonged periods of S to SW winds bring in dust and haze, apparently from the cement plants at Victorville and Monolith and, possibly, from the Los Angeles Basin and the San Joaquin Valley. Smoke from the vicinity of the housing area may limit visibility in the southeast quadrant, particularly during winter morning hours while the usual surface inversion is in effect.

Fog is a very minor factor in limiting visibility, occurring as it does on an average of only 2 days per year, from November through March.

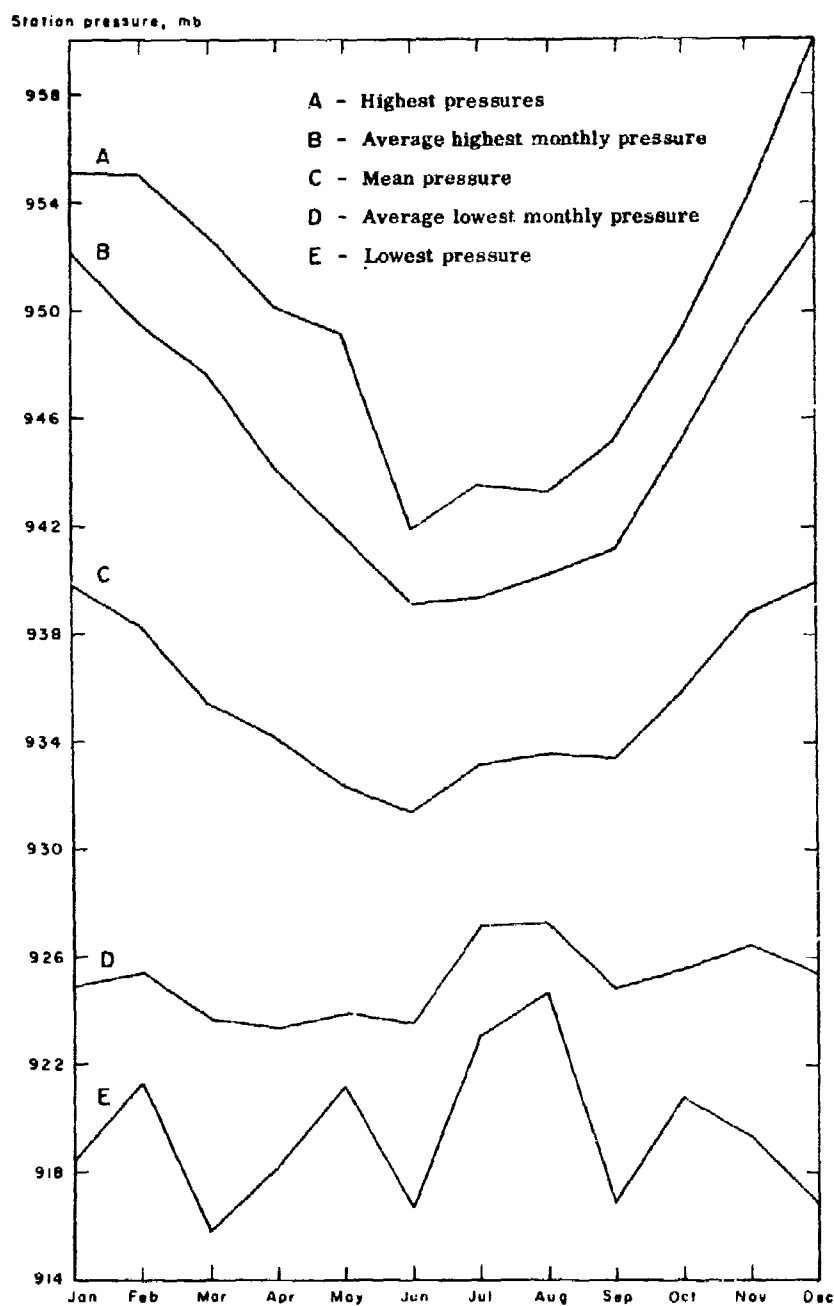


FIG. 1. Monthly Surface Pressures (1946-1968 inclusive).

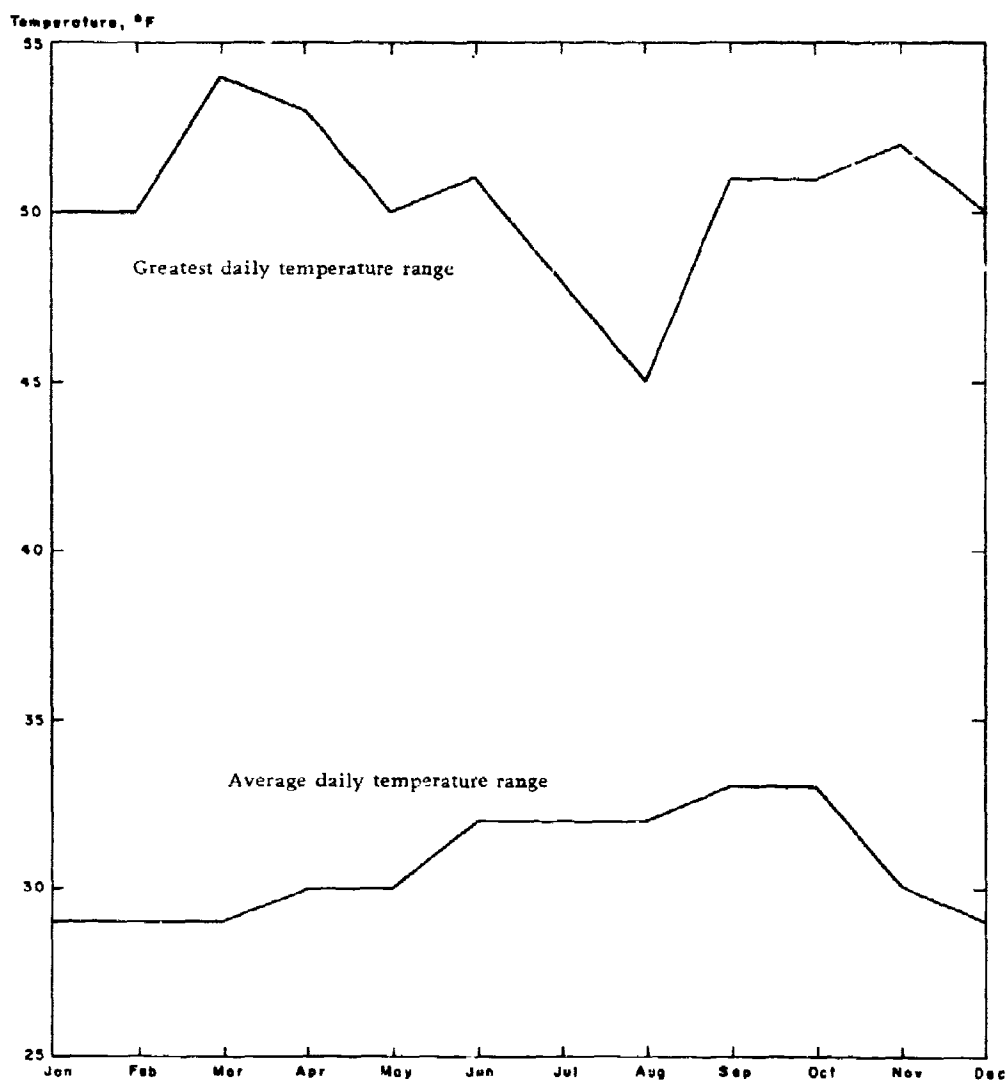


FIG. 2. Greatest Daily and Average Daily Temperature Ranges (1946-1968 inclusive).

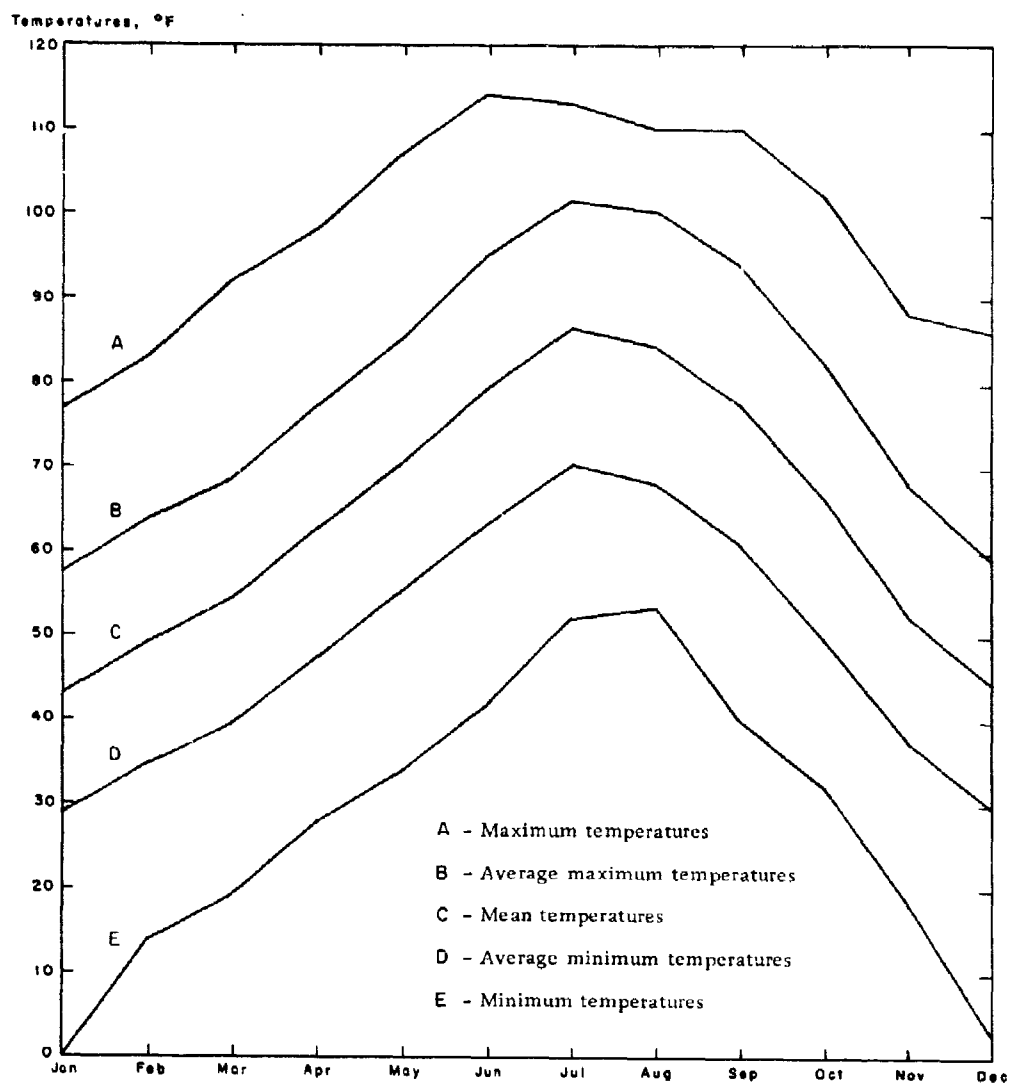


FIG. 3. Average and Extreme Temperatures (1946-1968 inclusive).

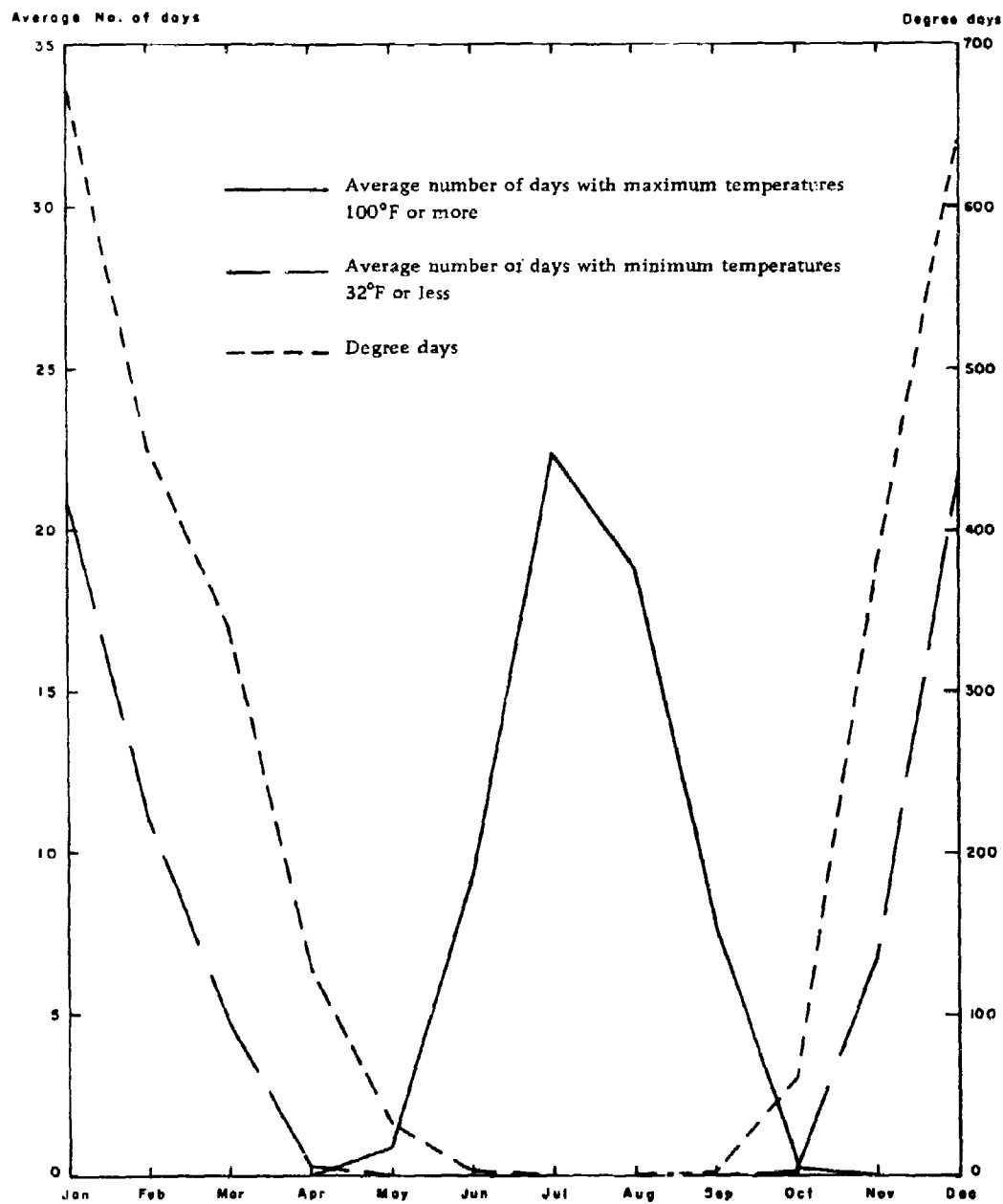


FIG. 4. Degree Days and Days With Temperatures 100°F or More and 32°F or Less.

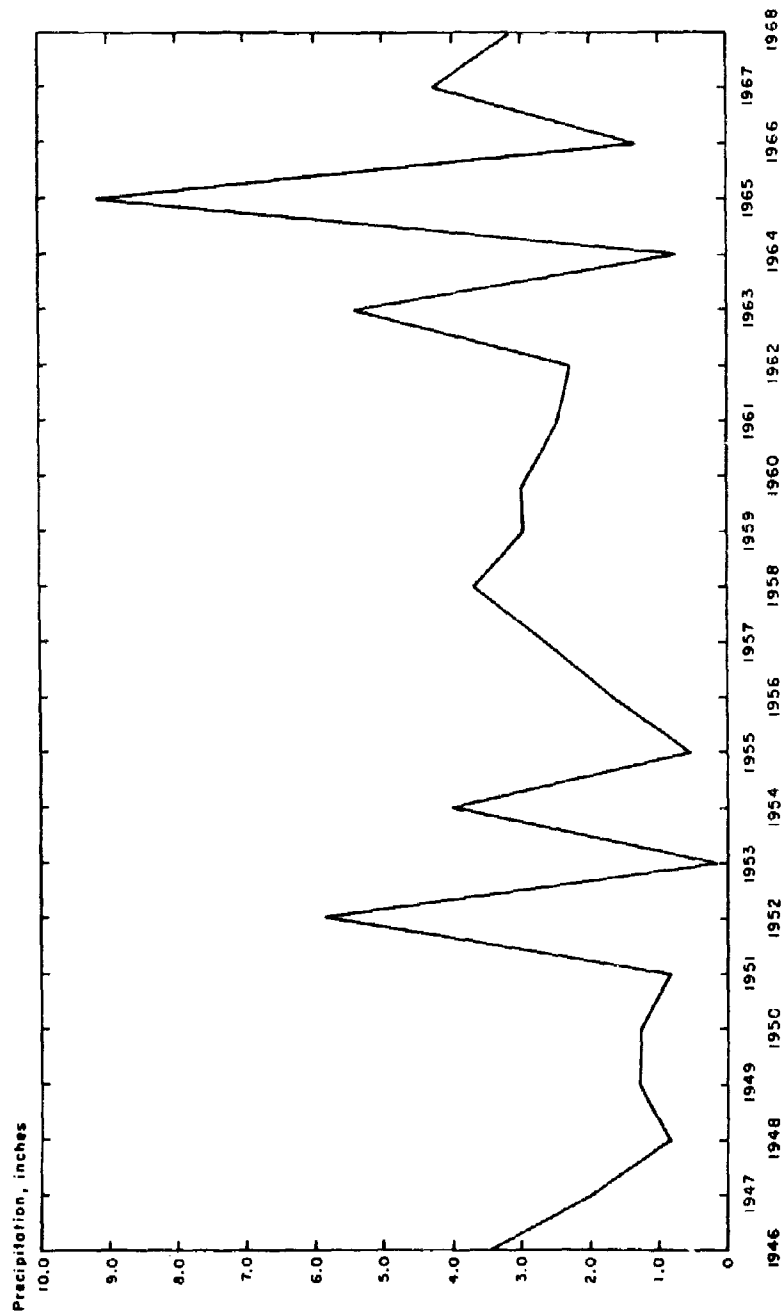


FIG. 5. Annual Precipitation in Inches by Calendar Year, 1946 Through 1968.

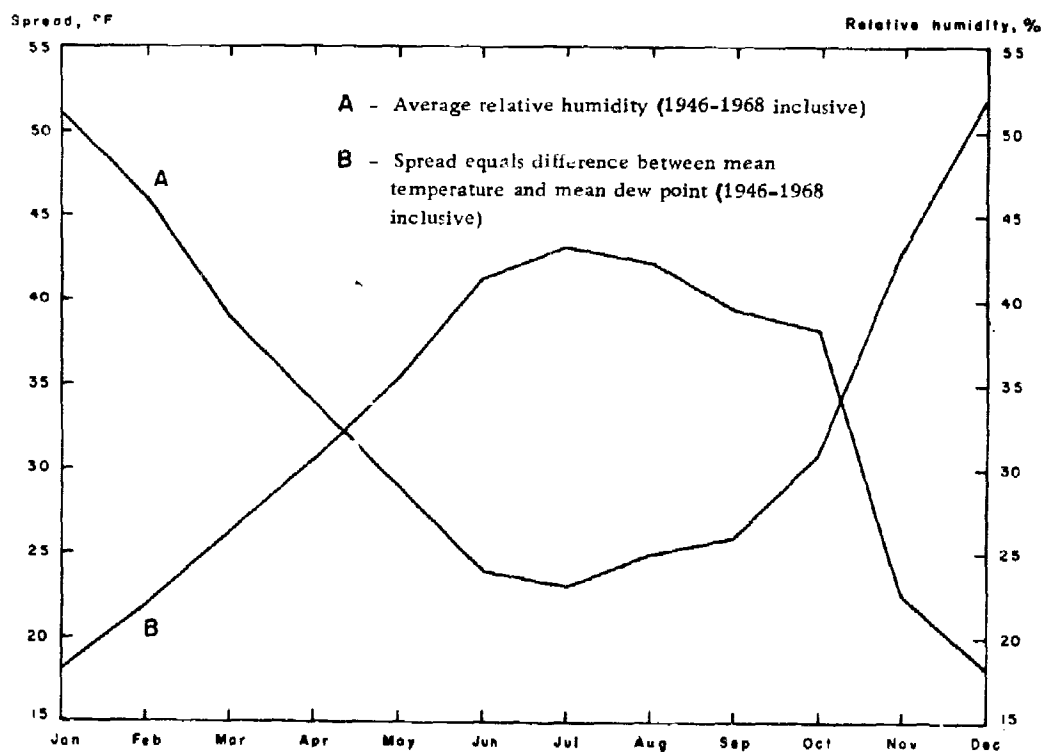


FIG. 6. Relative Humidity and Spread (Temperature and Dew Point).

TABLE 1. Surface Weather Summary 1946-

Month	Average air density (slugs/ft <sup>3</sup> )	Station pressure (millibars)	Mean maximum temperatures	Mean minimum temperatures	Mean temperatures	Highest temperature	Date	Lowest temperature	Date	Greatest daily range	Average daily range	Total heating (degree days)	Days min. temperature 32° or less	Days max. temperature 100° or more	Mean temperature of dew point	Mean relative humidity	Average precipitation	Greatest precipitation
Jan	0.00227	939.8	57.7	29.0	43.2	77	23/48	0	13/63	50	29	678	21.2	0	25	51	0.42	0.91
Feb	0.00224	938.3	63.8	34.4	49.0	83	27/68	14	13/48 12/65	50	29	452	11.1	0	27	46	0.38	1.28
Mar	0.00221	935.4	68.6	39.7	54.2	92	31/66	19	4/66	54	29	336	4.8	0	28	39	0.22	0.89
Apr	0.00217	934.1	77.3	47.6	62.7	98	1/66	28	9/53 22/63	53	30	130	0.3	0	32	34	0.17	0.88
May	0.00213	932.3	85.4	55.4	70.4	107	26/51	34	1/67	50	30	32	0	0.9	35	29	0.02	0.16
Jun	0.00210	931.4	95.0	63.3	79.4	114	22/54 20, 21/61	42	10/54	51	32	1.3	0	9.4	38	24	0.02	0.29
Jul	0.00207	933.1	101.9	70.2	86.2	113	11, 19/59 18/60	52	5/64	48	32	0	0	22.2	43	23	0.14	0.87
Aug	0.00208	933.5	100.2	68.1	84.2	110	19/50 11, 12/58 12/60 13, 14/62 6/66 13/67	53	30/53 23/60	45	32	0	0	18.9	42	25	0.11	0.75
Sep	0.00211	933.4	94.0	61.0	77.5	110	1, 2/50 6/55	40	26, 27/48	51	33	1.0	0	7.7	38	26	0.26	0.94
Oct	0.00216	935.9	82.7	49.8	66.3	102	5/64	32	30/46 15/66	51	33	60	0.1	0.3	33	31	0.10	0.58
Nov	0.00223	938.8	68.0	37.7	52.6	88	1/62	18	20/64	52	30	375	6.7	0	30	43	0.48	1.03
Dec	0.00227	939.9	58.8	29.8	44.1	86	23/64	2	27/62	50	29	648	21.6	0	26	52	0.44	1.14
Total												2,713	65.8	59.4			2.76	
Av	0.00217	935.5	79.4	48.8	64.2						31				33	35		
Extreme						114	6/22/54 6/20, 21/61	0	1/13/63	54								1.28

Note:

Cloudiness 1946 through 1964 (24-hour cloudiness data not now collected).

Surface Weather Summary 1946-1968 (23 Years)

	Min. temperature 32° or less	Days max. temperature 100° or more	Mean temperature of dew point	Mean relative humidity	Average precipitation	Greatest precipitation in 24 hours	Days with precipitation 0.01 inches or more	Days with thunderstorms	Total snowfall unmelted	Days with snowfall	Prevailing wind direction	Average hourly speed (mph)	Max. velocity (mph) (peak gust)	Direction of peak gust	Date	Number of days clear (see note)	Number of days partly cloudy	Number of days cloudy	Average cloudiness (%)	Days with hail	Days with blowing dust	Days with fog	Haze
2	0	25	51	0.42	0.91	2.0	0	0.8	0.9	SW	6.0	77	SW	14/50	15.3	10.6	5.1	37	0	0.6	0.4	0.2	
1	0	27	46	0.38	1.28	1.7	0	0	0.2	SW	7.1	69	W	22/48	14.2	10.0	4.1	34	0	1.4	0.3	0.1	
8	0	28	39	0.22	0.89	1.3	0.1	0	0.1	SW	9.7	81	W	19/52	15.0	12.4	3.6	34	0	1.5	0.1	0.1	
3	0	32	34	0.17	0.88	1.3	0.3	0	0	SW	10.3	69	N	2/57	16.0	11.2	2.8	31	0.1	1.0	0	0.3	
	0.9	35	29	0.02	0.16	0.4	0.3	0	0	SW	10.4	66	SW	23/62	19.9	9.1	2.0	27	0	0.8	0	0	
	9.4	38	24	0.02	0.29	0.3	0.3	0	0	SW	9.8	68	WSW	20/47	24.8	4.5	0.7	15	0	0.3	0	0	
	22.2	43	23	0.14	0.87	0.6	0.8	0	0	SW	9.1	66	NW	24/49	24.4	5.8	0.8	16	0	0	0	0	
	18.9	42	25	0.11	0.75	0.6	0.7	0	0	SW	9.0	53	ESE	11/53	25.0	4.2	0.8	14	0	0.6	0	0.1	
	7.7	38	26	0.26	0.94	1.1	0.2	0	0	SW	7.7	60	WSW W	16/46 24/48	25.4	3.8	0.8	13	0	0.3	0	0	
1	0.3	33	31	0.10	0.58	0.7	0.1	0	0	SW	7.2	66	NW	23/56	21.7	8.1	1.2	21	0	0.5	0	0.2	
7	0	30	43	0.48	1.03	1.7	0.1	0	0	SW	5.9	65	SW	18/50	19.0	8.6	2.4	26	0	0.4	0.6	0.2	
6	0	26	52	0.44	1.14	1.9	0	0	0.3	SW	5.6	71	SSW	4/53	16.0	10.8	4.2	34	0	0.7	0.8	0	
8	59.4			2.76		11.8	2.9	0.8	1.5										0.1	8.1	2.2	1.2	
		33	35							SW	8.2				19.8	8.2	2.4	25					
					1.28							81	W	3/19/52									

TABLE 2. Solar and Sky Radiation

Monthly averages of the total daily solar radiation (direct and diffuse) in gram calories/cm<sup>2</sup>, received on a horizontal surface, measured at NWC with a 50-junction Eppley pyrheliometer placed on the roof of the Instrumentation Laboratory at G-1 Range.\*

Month	1949**	'49	'50	'51	'52	'53	'54	'55	'56	'57	'58	'59	'60	'61	'62	'63	'64	'65	'66	'67	NWC Av.
Jan	227	313	-	286	269	305	333	314	311	312	337	362	322	356	352	350	352	336	339	296	325
Feb	295	406	-	433	373	411	458	454	492	407	-	435	404	453	413	456	487	468	422	369	432
Mar	416	522	-	554	516	557	587	620	625	608	516	628	588	640	601	588	619	585	599	487	580
Apr	523	616	-	640	624	663	750	742	720	768	754	735	728	773	778	728	750	694	791	-	721
May	493	700	-	756	735	766	797	806	808	784	824	844	821	858	857	805	832	844	850	-	805
Jun	593	729	-	810	768	828	842	844	857	849	882	872	877	886	912	857	896	851	860	-	848
Jul	584	744	-	767	728	754	776	779	775	837	829	789	823	837	873	881	866	809	864	-	808
Aug	531	673	-	742	715	727	745	725	756	763	709	740	800	728	811	748	754	752	756	-	744
Sep	469	587	-	636	-	615	674	646	648	650	651	652	646	655	680	590	667	652	526	-	636
Oct	356	487	-	469	-	500	474	502	505	449	485	492	516	462	516	466	474	503	-	428	483
Nov	279	375	342	312	-	346	346	367	386	367	358	390	358	355	368	357	350	286	288	279	346
Dec	223	293	278	243	243	311	292	275	329	299	319	288	335	313	317	331	293	277	253	259	292
Av.	416	537	-	554	-	565	590	590	601	592	606	602	601	610	623	597	612	588	-	-	585

\*Instrument moved to this location in February 1958. Former location was on the roof of the third story of Michelson Laboratory.

\*\*Riverside, California, data listed for comparison.

1968 data doubtful and missing.

TABLE 3. Monthly and Annual Precipitation by Calendar Year (1946-1968)

T = trace (less than 0.005 in.)

Month	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Jan	T	T	T	0.55	0.09	0.08	2.13	T	1.41	0.48	0.71	1.00	0.38	0.50	0.47	0.35	0.75	0.14
Feb	0.07	0.04	0.19	0.14	0.16	0.01	0.15	0	0.40	T	T	0.41	1.53	0.84	0.91	T	1.46	1.02
Mar	0.24	0.08	0.02	0.14	0.05	T	1.76	T	0.45	0	0	0.02	0.65	0	T	T	0.09	0.20
Apr	T	0.44	0.06	0.05	T	0.01	0.05	0.06	0	0.01	0.94	0.01	0.58	T	0.04	T	0	T
May	0	T	0.16	0.03	0	0.13	0	T	0.02	T	0.01	0.06	T	0.03	0	0	T	0
Jun	0	0	0.10	T	T	0	T	0	0	0	0	0.03	0	0	0.29	0	0	0.02
Jul	0.03	0	0	T	0.18	T	0.02	0.02	0.05	0	T	T	T	0	0.05	0	T	0
Aug	T	T	0	0.03	T	T	T	T	0	0	0	0.01	T	0	0.55	T	0.71	
Sep	0.02	0	0	T	0.78	0	0.12	T	0.41	0	0	0.05	0.15	0.70	0.29	T	T	2.14
Oct	0.17	0.42	T	T	T	T	0	T	0	0	0.07	0.03	0.40	T	T	0.11	T	0.81
Nov	1.87	T	0	0.04	0.02	0.05	0.55	0.06	0.76	0.05	0	0.16	T	0.14	0.93	0.99	T	0.41
Dec	1.09	1.05	0.34	0.32	T	0.56	1.10	0	0.57	0.02	0	0.91	0	0.77	0.03	0.46	T	T
Year	3.49	2.03	0.87	1.30	1.28	0.84	5.88	0.14	4.07	0.56	1.73	2.68	3.70	2.98	3.01	2.46	2.30	5.45

Number of Days With Snow and Amounts of Water Content

Jan			1-T	7-0.55	1-T		1-T	3-0.40		2-0.05			2-0.28		2-0.54
Feb	1-0.03			1-T											2-T
Mar					1-T	2*-1.47									
Nov															
Dec			1*-0.12		1-T								1-T	1-T	
Year	1-0.03		2-0.12	8-0.55	3-T	2-1.47		1-T	3-0.40		2-0.05		3-0.28	1-T	4-0.54

\*Days with snow and rain mixed.

alendar Year (1946-1968)

19	1960	1961	1962	1963	1964	1965	1966	1967	1968	Average
0	0.47	0.35	0.75	0.14	0.12	0.01	0.23	0.22	T	0.42
4	0.91	T	1.46	1.02	T	0.10	0.08	0	1.28	0.38
	T	T	0.09	0.20	0.03	1.05	0	0.02	0.22	0.22
	0.04	T	0	T	T	1.35	0	0.29	0.04	0.17
8	0	0	T	0	T	0.02	0	T	0	0.02
	0.29	0	0	0.02	0	0.02	T	0	0.01	0.02
	0.05	0	T	0	0.12	1.30	T	0.17	1.35	0.14
	0	0.55	T	0.71	0.04	0.80	0.03	0.24	0.17	0.11
0	0.29	T	T	2.14	0.01	0	T	1.25	0	0.26
	T	0.11	T	0.81	0.15	0.02	T	0	0.04	0.10
4	0.93	0.99	T	0.41	0.20	2.89	0.08	1.88	T	0.48
7	0.03	0.46	T	T	0.11	1.59	0.89	0.21	0.05	0.44
8	3.01	2.46	2.30	5.45	0.78	9.15	1.31	4.28	3.16	2.76

Water Content

2-0.28		2-0.54							
		2-T							
				1*-0.03					
1-T	1-T				1*-T		1-0.01	1-T	
3-0.28	1-T	4-0.54		1-0.03	1-T		1-0.01	1-T	

TABLE 4. Monthly, Annual, and Average Precipitation  
(July - June, 1946 - 1968)

T = trace (less than 0.005 in.)

Month	1946/47	1947/48	1948/49	1949/50	1950/51	1951/52	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59
Jul	0.03	0	0	T	0.18	T	0.02	0.02	0.05	0	T	T	0.01
Aug	T	T	0	0.03	T	T	T	T	T	0	0	0	0.01
Sep	0.02	0	0	T	0.78	0	0.12	T	0.41	0	0	0.05	0.01
Oct	0.17	0.42	T	T	T	T	0	T	0	0	0.07	0.03	0.01
Nov	1.87	T	0	0.04	0.02	0.05	0.55	0.06	0.76	0.05	0	0.16	0.01
Dec	1.09	1.05	0.34	0.32	T	0.56	1.10	0	0.57	0.02	0	0.91	0.01
Jan	T	T	0.55	0.09	0.08	2.13	T	1.41	0.48	0.71	1.00	0.38	0.01
Feb	0.04	0.19	0.14	0.16	0.01	0.15	0	0.40	T	T	0.41	1.53	0.01
Mar	0.08	0.02	0.14	0.05	T	1.76	T	0.45	0	0	0.02	0.65	0.01
Apr	0.44	0.06	0.05	T	0.01	0.05	0.06	0	0.01	0.94	0.01	0.58	0.01
May	T	0.16	0.03	0	0.13	0	T	0.02	T	0.01	0.06	T	0.01
Jun	0	0.10	T	T	0	T	0	0	0	0	0.03	0	0.01
Year	3.74	2.00	1.25	0.69	1.21	4.70	1.85	2.36	2.28	1.73	1.60	4.29	1.91

Annual, and Average Precipitation for Rainfall Year  
(July - June, 1946 - 1968)

56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	Average
	T	T	T	0	0.05	0	T	0	0.12	1.30	T	0.17	0.09
	0	0	0.01	T	0	0.55	T	0.71	0.04	0.80	0.03	0.24	0.11
	0	0.05	0.15	0.70	0.29	T	T	2.14	0.01	0	T	1.25	0.27
	0.07	0.03	0.40	T	T	0.11	T	0.81	0.15	0.02	T	0	0.10
	0	0.16	T	0.14	0.93	0.99	T	0.41	0.20	2.89	0.08	1.88	0.50
	0	0.91	0	0.77	0.03	0.46	T	T	0.11	1.59	0.89	0.21	0.45
	1.00	0.38	0.50	0.47	0.35	0.75	0.14	0.12	0.01	0.23	0.22	T	0.44
	0.41	1.53	0.84	0.91	T	1.46	1.02	T	0.10	0.08	0	1.28	0.40
	0.02	0.65	0	T	T	0.09	0.20	0.03	1.05	0	0.02	0.22	0.22
	0.01	0.58	T	0.04	T	0	T	T	1.35	0	0.29	0.04	0.18
	0.06	T	0.03	0	0	T	0	T	0.02	0	T	0	0.02
	0.03	0	0	0.29	0	0	0.02	0	0.02	T	0	0.01	0.02
	1.60	4.29	1.93	3.32	1.65	4.41	1.38	4.22	3.18	6.91	1.53	5.30	2.80

## UPPER-AIR DATA

## RADIOSONDE SUMMARY

Table 5 summarizes data taken in ascents at Tower 8, G-1 Range. Humidity averages above 30,000 feet are not shown since data were often missing or were outside the limits of the sensing elements. Average high and low temperatures through 35,000 feet are now given, also the extreme readings.

The pressure trend at 5,000 feet is indeterminate. Through the troposphere (roughly 10,000-40,000 feet) the effect of frontal weather is apparent, with winter and spring months showing pressure and temperature minima.

The increased humidity from 10,000-20,000 feet in July and August, as compared to June, is probably the result of the more frequent southeasterly winds bringing moist air from the Gulf of Mexico.

## TROPOPAUSE HEIGHT

The average monthly heights of the tropopause for the years 1955-1957 and 1959-1963 are shown in Fig. 7. As might be expected, the arctic tropopause is not present during the summer months. Seasonal height variations are principally evident at the polar and temperate levels, with little change at the tropic tropopause. The monthly average potential temperatures at these tropopause are presented in Fig. 8.

More detailed information on the tropopause and related phenomena is given in Ref. 3 and 4.

## SUMMARY OF UPPER WINDS

Prevailing wind direction and speed are shown by months in Table 6. The directional quadrant is blocked in, with the frequency given in percent and the speed in knots.

At 3,000 feet, the prevailing wind direction is SE to S, evidently a combined result of mountain-valley eddy and morning thermal effects (see page 4). Directions at 5,000 feet appear indeterminate and transitional. At 10,000 feet and above, from November through March, the flow is mainly from W to WSW through NNW to NW. From May through

September, at 10,000-60,000 feet, it is from SW to S through WNW to WSW. The more southerly trend is a result of decreasing frontal activity and the formation of the summer thermal low. April and October show transitional tendencies in direction. Near 60,000 feet and above, from May through September, there is a pronounced shift to an easterly quadrant, extending through 115,000 feet from June through August.

Table 7 shows overall directional frequencies of 5%, or higher, and average speeds at each height through the year. Levels are at 3,000, 5,000, and each additional 5,000 feet through 115,000. The quadrant of highest frequency is blocked in. Results from fewer than 50 ascents in a month are probably more indicative than representative.

Highest average speeds occur at the 35,000-45,000 foot levels during the winter and spring months, when frontal activity is the strongest. This is near the main polar tropopause height where air-mass temperature contrasts are sharpest. There are indications of a secondary winter speed maximum above 100,000 feet, but data are not sufficient for definitive conclusions. Generally, speeds decrease sharply above 50,000 feet (especially in summer), occasionally dropping below 10 knots.

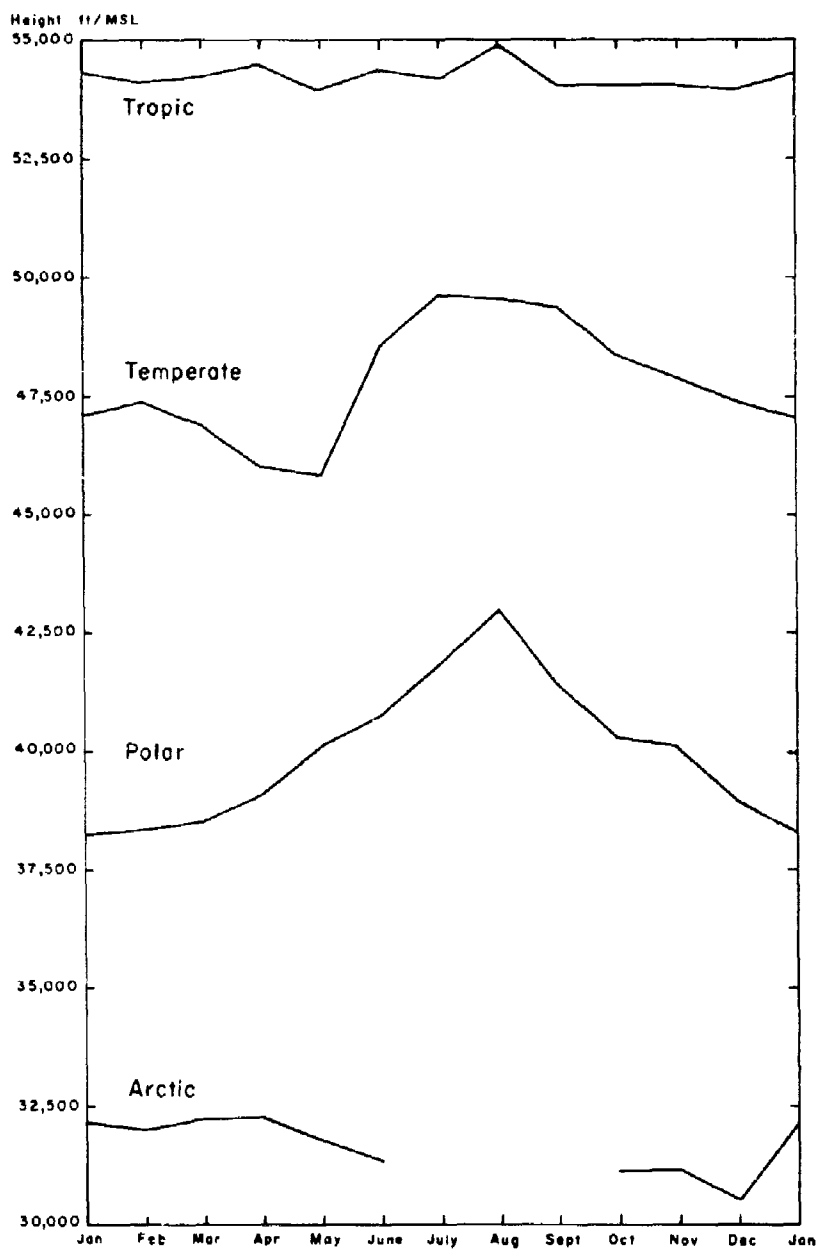


Fig. 7. Monthly Average Tropopause Heights  
Over NOTS (1955-57, 1959-63).

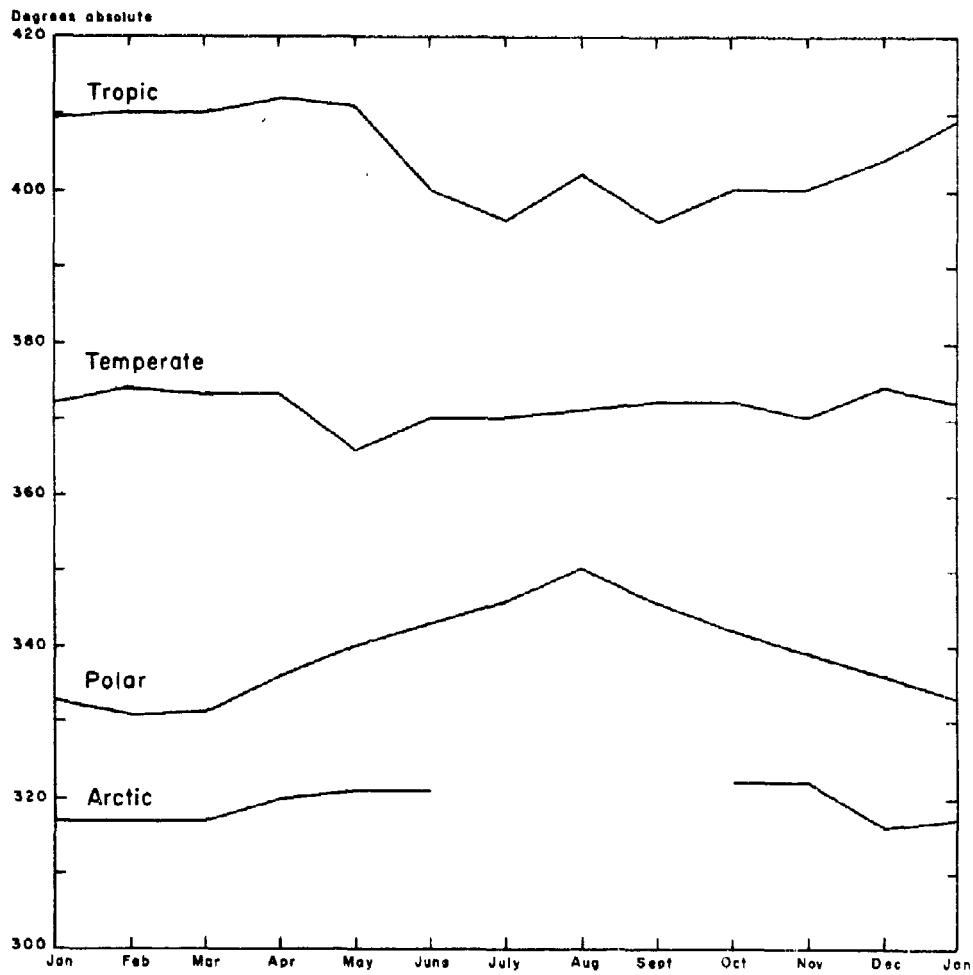


FIG. 8. Monthly Average Potential Temperatures at Tropopause Levels Over NOTS (1955-57, 1959-63).

TABLE 5. Summary of Radiosonde Data, 1949 - 1968

Monthly and yearly averages of pressure P (mb), mean temperature T (°C), relative humidity H (%), extreme high temperature HT (°C), average high temperature Avg H (°C), extreme low temperature LT (°C), average low temperature Avg L (°C), with the number of observations (# obs), at 5,000-ft levels

Height (ft)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
5,000													
P	849	849	847	847	846	846	849	849	848	850	849	849	848
T	5.5	7.8	8.4	11.8	15.7	20.3	24.3	23.5	20.8	16.7	10.4	6.7	14.3
RH	33	31	27	26	23	20	20	19	21	22	30	31	25
HT	14.7	17.2	20.7	24.7	28.4	32.0	33.2	31.6	32.5	26.8	20.3	19.2	
Avg H	11.2	13.4	15.6	20.2	23.8	28.5	29.8	29.2	26.9	22.7	17.2	13.6	20.2
LT	-8.2	-7.7	-4.4	-0.7	1.9	3.5	14.4	10.1	7.5	3.4	-4.5	-10.2	
Avg L	-1.4	-0.9	0.3	3.4	6.3	10.6	18.8	17.0	12.9	7.8	1.6	-0.3	6.3
# obs	474	464	555	556	603	603	609	588	583	593	501	425	546
10,000													
P	703	703	701	703	704	707	711	710	708	708	705	703	706
T	-1.4	-1.6	-1.8	0.4	4.8	9.0	12.9	12.1	9.4	6.6	2.1	-0.4	4.3
RH	27	28	28	29	27	22	26	25	26	24	29	28	27
HT	8.5	9.3	7.7	11.5	13.8	19.0	20.7	18.4	18.0	15.4	14.1	11.9	
Avg H	5.4	5.0	4.5	7.6	10.8	15.5	16.7	16.7	14.4	11.6	9.2	6.9	10.4
LT	-16.1	-14.1	-17.4	-13.8	-11.4	-9.1	5.1	-1.3	-1.3	-10.8	-15.8	-22.4	
Avg L	-10.1	-10.1	-11.5	-8.7	-5.7	-0.5	8.7	7.1	2.5	-2.4	-7.3	-9.2	-3.9
# obs	472	462	553	552	596	601	606	587	581	593	501	425	544
15,000													
P	580	579	577	579	582	586	590	590	587	586	582	580	583
T	-10.6	-11.1	-11.3	-9.3	-6.2	-1.3	1.6	0.9	-0.7	-2.7	-6.7	-9.5	-5.7
RH	27	25	23	23	22	21	28	26	22	20	24	24	24
HT	-1.1	-2.3	-1.4	0.2	3.0	7.8	8.3	9.5	8.6	5.8	4.0	1.5	
Avg H	-4.7	-5.5	-4.9	-3.0	0.2	3.9	4.8	5.0	4.2	1.8	-0.2	-2.1	0.0
LT	-26.9	-25.6	-27.1	-26.3	-20.7	-17.1	-6.8	-12.0	-12.0	-22.9	-25.4	-32.3	
Avg L	-19.4	-19.1	-21.4	-19.3	-15.5	-10.6	-2.1	-3.6	-6.8	-11.3	-17.0	-18.6	-13.7
# obs	465	458	542	539	579	588	583	574	569	583	489	417	532
20,000													
P	473	473	472	474	477	482	487	486	484	482	477	474	478
T	-21.3	-21.7	-21.8	-19.9	-16.7	-12.1	-8.8	-9.5	-10.9	-13.6	-17.1	-20.0	-16.1
RH	26	25	22	19	18	17	21	21	15	19	23	24	21
HT	-8.7	-12.0	-10.4	-10.4	-6.0	-2.0	-2.3	-3.5	-4.5	-5.7	-7.5	-8.6	
Avg H	-15.5	-16.1	-15.1	-13.8	-10.8	-6.6	-5.6	-5.6	-6.6	-8.5	-10.8	-12.7	-10.6
LT	-39.2	-38.6	-39.7	-37.7	-34.2	-29.0	-15.8	-23.3	-20.9	-34.4	-37.1	-39.2	
Avg L	-30.3	-29.8	-31.6	-29.8	-24.8	-21.2	-12.5	-14.6	-16.7	-21.6	-27.5	-29.1	-24.1
# obs	457	452	534	533	568	581	571	568	559	577	485	409	526

Contd.

TABLE 5. Contd.

Height (ft)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
25,000													
P	383	382	381	384	388	393	398	398	395	392	388	384	389
T	-32.8	-33.3	-33.3	-31.3	-28.0	-23.3	-19.3	-19.8	-21.7	-24.5	-28.2	-31.6	-27.3
RH	25	21	21	19	17	15	16	15	14	20	22	22	19
HT	-21.5	-21.7	-24.5	-22.0	-16.0	-14.5	-12.0	-13.1	-13.8	-15.5	-18.1	-20.2	
Avg H	-26.2	-27.4	-26.8	-25.3	-22.0	-18.0	-15.9	-16.3	-17.3	-20.0	-21.9	-24.2	-21.8
LT	-51.6	-49.9	-47.8	-47.8	-41.8	-39.0	-27.0	-35.3	-34.5	-41.8	-45.3	-46.2	
Avg L	-40.4	-40.8	-40.4	-39.4	-34.9	-32.8	-23.4	-25.1	-27.5	-32.0	-37.1	-38.4	-34.4
# obs	416	403	483	461	507	521	524	515	465	513	428	369	467
30,000													
P	307	306	305	307	312	317	323	322	319	316	312	308	313
T	-44.4	-44.8	-44.8	-42.8	-39.9	-35.1	-30.4	-31.2	-33.5	-36.7	-40.0	-42.5	-38.8
RH	23	27	20	18	15	13	14	14	13	16	20	21	17
HT	-32.5	-33.4	-33.5	-33.6	-29.0	-23.9	-17.5	-25.0	-25.6	-27.5	-29.6	-31.6	
Avg H	-37.5	-38.4	-38.8	-37.4	-34.1	-29.5	-26.5	-27.1	-29.2	-31.5	-33.8	-36.6	-33.3
LT	-54.4	-56.9	-54.9	-53.7	-52.5	-47.8	-38.8	-40.9	-42.6	-47.0	-53.2	-53.4	
Avg L	-50.6	-51.1	-50.1	-48.9	-46.2	-42.6	-35.2	-36.0	-38.3	-42.3	-46.7	-48.2	-44.7
# obs	399	390	458	436	475	492	466	481	448	473	412	358	441
35,000													
P	242	242	242	244	248	254	259	258	256	253	248	244	249
T	-54.1	-54.3	-54.7	-52.7	-50.4	-45.8	-41.2	-42.1	-44.1	-47.3	-50.2	-52.3	-49.1
HT	-39.8	-37.9	-38.6	-37.3	-39.6	-35.7	-25.7	-35.0	-36.2	-37.8	-40.5	-36.3	
Avg H	-46.3	-45.7	-46.6	-45.4	-44.0	-40.6	-37.2	-38.1	-39.4	-41.9	-43.6	-44.9	-42.8
LT	-62.5	-62.9	-62.4	-60.6	-59.3	-54.5	-50.0	-51.1	-56.4	-58.1	-59.7	-62.3	
Avg L	-59.6	-59.6	-59.3	-57.2	-56.0	-51.6	-45.6	-46.4	-48.5	-52.2	-56.0	-57.0	-54.1
# obs	383	375	409	412	438	471	432	460	415	441	392	343	414
40,000													
P	191	191	190	191	196	201	206	206	203	200	196	193	197
T	-58.2	-57.2	-58.2	-58.0	-57.1	-54.3	-51.3	-51.4	-52.8	-55.4	-57.5	-57.6	-55.8
# obs	369	358	393	374	416	446	408	444	395	428	375	318	394
45,000													
P	150	150	149	151	154	158	162	162	160	157	153	151	155
T	-58.5	-57.4	-57.6	-57.7	-58.2	-58.9	-60.0	-59.6	-59.4	-60.5	-61.4	-59.4	-59.0
# obs	352	343	369	356	395	386	370	398	366	403	348	288	364
50,000													
P	118	118	117	118	120	123	127	126	125	123	120	118	121
T	-61.0	-60.9	-59.3	-59.0	-59.0	-61.9	-65.9	-65.1	-64.2	-64.5	-63.4	-61.9	-62.2
# obs	341	328	345	335	361	352	350	379	340	382	322	281	343
55,000													
P	92.1	92.2	92.4	92.9	94.4	96.6	98.5	98.1	97.3	95.6	93.5	92.6	94.7
T	-62.7	-62.5	-60.6	-60.2	-60.2	-62.8	-65.9	-65.3	-65.0	-65.7	-64.8	-63.9	-63.3
# obs	303	298	315	316	316	319	320	348	305	339	298	262	312
60,000													
P	72.0	72.2	71.9	72.9	74.0	75.6	76.9	76.8	76.0	74.5	73.0	72.2	74.0
T	-61.9	-62.6	-60.8	-59.7	-59.8	-60.8	-61.6	-61.3	-62.0	-63.4	-63.9	-63.3	-61.8
# obs	289	276	305	303	292	294	300	318	280	313	283	254	292

Contd.

TABLE 5. Contd.

Height (ft)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
65,000													
P	56.2	56.3	56.3	57.0	58.0	59.2	60.3	60.2	59.4	58.0	56.8	56.4	57.8
T	-60.5	-60.7	-59.1	-58.3	-57.7	-57.7	-57.5	-57.1	-58.2	-60.4	-61.7	-61.5	-59.2
# obs	276	263	292	282	279	282	290	302	263	297	263	244	278
70,000													
P	44.2	44.2	44.3	45.1	45.8	46.7	47.4	47.4	46.9	45.8	44.6	44.2	45.6
T	-58.8	-59.1	-56.7	-55.4	-55.3	-54.8	-54.4	-58.0	-55.3	-57.8	-60.0	-59.8	-57.1
# obs	249	242	278	263	259	265	272	275	250	277	240	224	258
75,000													
P	34.7	34.7	34.8	35.5	36.2	36.9	37.4	37.4	37.0	36.1	35.0	34.7	35.9
T	-57.1	-57.0	-55.5	-54.2	-52.8	-51.6	-51.8	-51.8	-52.9	-54.9	-57.6	-57.8	-54.6
# obs	235	214	268	243	245	247	254	254	237	261	229	214	242
80,000													
P	27.3	27.4	27.5	28.0	28.5	29.2	29.7	29.7	29.2	28.4	27.5	27.3	28.3
T	-55.2	-54.8	-53.4	-51.9	-50.1	-49.4	-49.1	-49.4	-50.3	-52.4	-55.6	-56.3	-52.3
# obs	211	194	235	222	229	226	241	244	211	236	210	194	221
85,000													
P	21.6	21.6	21.8	22.3	22.7	23.2	23.6	23.6	23.2	22.5	21.8	21.5	22.4
T	-53.5	-52.5	-50.9	-49.6	-47.7	-46.8	-46.7	-46.9	-48.0	-50.3	-53.7	-54.3	-50.1
# obs	193	178	204	203	215	207	218	224	201	226	197	179	204
90,000													
P	17.1	17.2	17.3	17.7	18.1	18.6	18.8	18.8	18.5	17.8	17.2	17.0	17.8
T	-51.6	-50.1	-48.5	-46.7	-44.9	-44.0	-44.0	-44.4	-45.7	-48.4	-51.6	-52.5	-47.7
# obs	170	162	174	181	195	184	182	204	180	192	177	156	180
95,000													
P	13.6	13.7	13.8	14.1	14.4	14.8	15.0	15.0	14.7	14.2	13.6	13.4	14.2
T	-50.1	-47.7	-45.8	-43.6	-42.1	-41.2	-41.4	-41.9	-43.6	-46.5	-49.4	-50.3	-45.3
# obs	151	146	151	166	174	160	167	189	162	172	160	143	162
100,000													
P	10.8	10.9	10.9	11.3	11.7	12.0	12.1	12.0	11.8	11.3	10.8	10.6	11.4
T	-47.0	-45.0	-43.1	-40.6	-39.2	-38.5	-38.8	-39.8	-41.3	-44.6	-47.0	-48.1	-42.7
# obs	132	130	136	149	165	140	157	174	145	147	141	126	145
105,000													
P	8.6	8.7	8.8	9.0	9.3	9.5	9.7	9.6	9.4	9.0	8.6	8.4	9.0
T	-44.5	-42.6	-39.9	-37.5	-36.3	-35.5	-36.0	-37.2	-39.1	-42.0	-44.1	-45.4	-40.0
# obs	110	115	114	126	146	117	143	155	124	121	104	103	123
110,000													
P	6.9	6.9	7.0	7.3	7.5	7.7	7.8	7.7	7.5	7.3	6.9	6.8	7.3
T	-42.8	-40.1	-36.7	-34.6	-33.5	-32.8	-33.4	-34.8	-37.1	-39.3	-41.3	-43.2	-37.5
# obs	84	81	82	102	119	89	119	117	97	94	72	71	94
115,000													
P	5.5	5.6	5.6	5.9	6.1	6.2	6.3	6.2	6.1	5.9	5.5	5.4	5.9
T	-40.5	-37.5	-33.8	-30.9	-30.1	-30.2	-30.9	-32.2	-35.2	-37.5	-39.2	-40.0	-34.8
# obs	52	47	45	63	77	42	80	85	66	41	39	46	57

TABLE 6. Prevailing Winds Aloft, January Through December

Month: January

Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	S	W	W	W	N	N
	N	N	E	N	E	E	S	S	S	S	S	W	S	W	N	N	N
	E	E	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W
115													64%		72 K		
110													54%		63 K		
105			43%			30 K											
100			51%			28 K											
95			53%			27 K											
90			54%			25 K											
85			56%			22 K											
80			58%			20 K											
75			48%			13 K											
70		43%			15 K												
65														50%		19 K	
60														76%		25 K	
55														83%		31 K	
50														79%		43 K	
45														80%		52 K	
40														73%		58 K	
35														64%		57 K	
30														59%		54 K	
25														59%		45 K	
20															58%		37 K
15														55%		32 K	
10															48%		23 K
5		11 K															41%
3							36%		4 K								
	N	N	N	E	E	E	E	S	S	S	S	S	W	W	W	N	N
		E	E	E	E	E	E	E	E	E	E	E	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: February

Height in thousands of ft MSL	N	N	N	E	E	S	S	S	S	S	S	W	W	W	N	N	N
		E	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W
115												40%	39 K				
110												47%	35 K				
105												48%	29 K				
100												44%	30 K				
95			40%	25 K													
90			45%	21 K													
85			45%	18 K													
80		47%	15 K														
75		48%	13 K														
70												40%	14 K				
65												61%	17 K				
60												76%	24 K				
55												83%	33 K				
50												86%	44 K				
45												84%	54 K				
40												78%	60 K				
35												66%	60 K				
30												63%	52 K				
25												61%	48 K				
20												58%	35 K				
15												51%	28 K				
10														47%	20 K		
5	10 K														40%		
3						40%	4 K										
	N	N	N	E	E	S	S	S	S	S	S	W	W	W	N	N	N
		E	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: March

Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	S	W	W	W	N	N
	N	N	E	N	E	S	E	S	S	S	W	S	W	W	N	W	N
		E		E		E		E				W	W		W		W
115												76%		66 K			
110												61%		58 K			
105												56%		49 K			
100												55%		41 K			
95													53%		36 K		
90												49%		28 K			
85													49%		24 K		
80			44%			15 K											
75													41%		19 K		
70													47%		19 K		
55													65%		18 K		
60													81%		24 K		
55													87%		33 K		
50													89%		43 K		
45													90%		53 K		
40													83%		58 K		
35													73%		58 K		
30													66%		54 K		
25													65%		47 K		
20													63%		38 K		
15													58%		31 K		
10													48%		23 K		
5												31%		12 K			
3								39%		6 K							
	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N	N
		E	E	E		E	E	E		W	W	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: April

Height in thousands of ft MSL	N	N N	N E	E N	E E	E S	S E	S S	S S	S S	S W	S W	W S	W W	W N	N W	N N
115												97%	29 K				
110												98%	31 K				
105												88%	29 K				
100												74%	24 K				
95												67%	21 K				
90												56%	19 K				
85												42%	16 K				
80			43%		11 K												
75						43%		10 K									
70												39%	11 K				
65												55%	14 K				
60												76%	21 K				
55												86%	30 K				
50												88%	38 K				
45												87%	47 K				
40												74%	55 K				
35													68%	53 K			
30													63%	50 K			
25													60%	43 K			
20													61%	36 K			
15													54%	28 K			
10													43%	20 K			
5										36%	10 K						
3							38%	7 K									
	N	N N	N E	E N	E E	E S	S E	S S	S S	S S	S W	S W	W S	W W	W N	N W	N N

Contd.

TABLE 6. Contd.

Month: May

Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	S	W	W	W	W	N	N
	N	N	N	E	E	E	S	S	S	S	S	S	W	W	W	W	N	N
115													56%	20 K				
110													54%	16 K				
105													47%	15 K				
100													46%	13 K				
95				45%	15 K													
90				48%	14 K													
85				52%	14 K													
80				64%	12 K													
75				71%	11 K													
70			58%	9 K														
65					35%	7 K												
60											67%	14 K						
55												87%	22 K					
50												91%	32 K					
45												91%	43 K					
40												79%	50 K					
35												71%	50 K					
30												66%	45 K					
25												65%	38 K					
20												57%	32 K					
15													46%	25 K				
10													36%	18 K				
5											32%	9 K						
3											32%	10 K						
	N	N	N	E	E	E	S	S	S	S	S	S	W	W	W	W	N	N
		E	E	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: June

Height in thousands of ft MSL	N	N	N	E	E	S	S	S	S	S	W	W	W	N	N
	N	N	E	N	E	S	S	S	S	W	S	W	N	N	N
	E	E	E	E	E	E	E	W	W	W	W	W	W	W	W
115				97%	26 K										
110				94%	28 K										
105				95%	26 K										
100				96%	25 K										
95			95%	22 K											
90				97%	20 K										
85				97%	20 K										
80				97%	19 K										
75				98%	17 K										
70				93%	15 K										
65				79%	11 K										
60						46%	9 K								
55								67%	16 K						
50										80%	30 K				
45										83%	43 K				
40										75%	50 K				
35										70%	45 K				
30										65%	42 K				
25										64%	36 K				
20										60%	29 K				
15										50%	22 K				
10									38%	15 K					
5							33%	8 K							
3						45%	5 K								
	N	N	N	E	E	E	S	S	S	S	W	W	W	N	N
	E	E	E	E	E	E	E	E	W	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: July

Height in thousands of ft MSL	N	N N	N E	E N	E E	S E	S S	S S	S S	S W	S W	S W	W	W N	N W	N N
115				100%	43 K											
110				100%	39 K											
105				100%	38 K											
100				100%	36 K											
95				100%	33 K											
90				100%	31 K											
85				100%	29 K											
80				100%	26 K											
75				99%	23 K											
70				99%	20 K											
65				95%	16 K											
60					81%	13 K										
55								64%	14 K							
50									74%	24 K						
45										88%	36 K					
40										84%	40 K					
35											78%	37 K				
30												73%	30 K			
25										65%	24 K					
20											59%	19 K				
15									59%	16 K						
10										58%	14 K					
5										47%	8 K					
3							49%	6 K								
	N	N E	N E	E N E	E E E	S E E	S S E	S S	S S W	S W	S W	W S W	W	W N W	N W	N N W

Contd.

TABLE 6. Contd.

Month: August

Height in thousands of ft MSL	N	N	N	E	E	S	S	S	S	S	S	W	W	W	N	N
	N	N	N	E	E	S	S	S	S	S	S	W	W	W	N	N
115				100%	38 K											
110				98%	34 K											
105				99%	33 K											
100			100%		32 K											
95				99%	30 K											
90				100%	29 K											
85				100%	26 K											
80				99%	23 K											
75				98%	20 K											
70				95%	16 K											
65				85%	13 K											
60				59%	11 K											
55									54%		13 K					
50										69%	26 K					
45										82%	37 K					
40										81%	41 K					
35										75%	37 K					
30										70%	32 K					
25										68%	26 K					
20									62%	22 K						
15									63%	18 K						
10									61%	15 K						
5									45%	9 K						
3					48%	6 K										
	N	N	N	E	E	S	S	S	S	S	S	W	W	W	N	N
		E	E	E	E	E	E	E	E	W	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: September

Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
	N	N	E	N	E	E	S	S	S	S	W	W	W	N	N	W
115							47%	17 K								
110							59%	16 K								
105							61%	15 K								
100							66%	16 K								
95							76%	16 K								
90							73%	15 K								
85							78%	14 K								
80							76%	13 K								
75							74%	11 K								
70							63%	11 K								
65							46%	9 K								
60													36%	11 K		
55													63%	19 K		
50													77%	35 K		
45													75%	47 K		
40													69%	52 K		
35													67%	46 K		
30													65%	39 K		
25													60%	32 K		
20													54%	26 K		
15													49%	21 K		
10													48%	18 K		
5													40%	10 K		
3													44%	6 K		
	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
		E	E	E	E	E	E	E	E	S	W	W	W	N	W	W

Cont d.

TABLE 6. Contd.

Month: October

Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
	N	N	E	N	E	S	E	S	S	S	W	S	W	N	W	N
	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W	W
115												86%	45 K			
110												81%	37 K			
105												81%	28 K			
100												69%	24 K			
95												67%	20 K			
90												66%	16 K			
85												53%	14 K			
80												50%	11 K			
75												40%	10 K			
70	33%		9 K													
65												42%	13 K			
60												51%	17 K			
55												63%	23 K			
50												66%	33 K			
45												64%	40 K			
40												57%	42 K			
35												49%	40 K			
30												45%	36 K			
25												44%	32 K			
20												44%	29 K			
15												39%	24 K			
10												33%	18 K			
5										33%	10 K					
3						41%	4 K									
	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
	E	E	E	E	E	E	E	E	E	W	W	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: November																
Height in thousands of ft MSL	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
		E	E	E	E	E	E	E	E	E	E	W	W	W	W	W
115												77%	49 K			
110												83%	51 K			
105												83%	44 K			
100												77%	37 K			
95												73%	31 K			
90												68%	24 K			
85												61%	22 K			
80												54%	18 K			
75												49%	16 K			
70												49%	15 K			
65												58%	18 K			
60												71%	21 K			
55												74%	30 K			
50												73%	42 K			
45												76%	51 K			
40												66%	58 K			
35												56%	54 K			
30												50%	46 K			
25												52%	43 K			
20												52%	36 K			
15												49%	30 K			
10														40%	20 K	
5	42%	9 K														
3							41%	4 K								
	N	N	N	E	E	E	S	S	S	S	S	W	W	W	N	N
		E	E	E	E	E	E	E	E	E	E	W	W	W	W	W

Contd.

TABLE 6. Contd.

Month: December

Height in thousands of ft MSL	N	N N	N E	E N	E	S E	S E	S E	S S	S S	S W	W S	W S	W N	W N	N N
115												94%	84 K			
110												83%	73 K			
105												78%	57 K			
100												75%	47 K			
95												71%	37 K			
90												56%	29 K			
85												46%	26 K			
80		40%		17 K												
75		42%		16 K												
70													43%	15 K		
65												52%	16 K			
60												67%	21 K			
55												76%	31 K			
50												78%	41 K			
45												75%	50 K			
40												67%	57 K			
35												61%	56 K			
30												59%	53 K			
25													56%	49 K		
20													55%	40 K		
15													51%	33 K		
10													45%	25 K		
5		12 K														39%
3						36%		3 K								
	N	N E	N E	E N	E	S E	S E	S E	S	S W	S W	W S	W S	W N	W N	N N

TABLE 7. Frequencies of Direction (%) and Average Speeds in Knots (K) of Winds (3,000 Through 115,000 Feet MSL) by Months, 1946 Through 1968

Altitude: 3,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	6		6		6		-		-		-	
N	9	9	9	8	6	10	6	10	7	9	6	8
NNE	6	7	6	6	-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	5	3	5	3	-		-		6	4	5	4
ESE	8	3	8	3	7	4	7	4	8	5	10	4
SE	9	3	11	4	11	5	9	5	7	6	14	5
SSE	11	3	12	4	12	5	10	5	6	5	12	5
S	8	5	9	5	9	6	10	8	10	6	9	6
SSW	7	7	6	9	7	9	9	10	6	9	8	8
SW	5	7	-		7	10	9	12	6	10	6	8
WSW	-		-		7	17	7	15	10	13	-	
W	5	8	-		6	14	6	12	7	16	5	10
WNW	-		-		-		-		-		-	
NW	-		-		-		-		-		-	
NNW	-		-		-		-		-		-	
# observations	1,073		873		981		963		1,048		1,076	
Average speed		5		6		8		8		7		6

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		-		-		-		6		6	
N	-		-		7	8	7	8	9	7	9	11
NNE	-		-		-		-		5	6	-	
NE	-		-		-		-		-		-	
ENE	-		5	4	-		-		-		-	
E	6	4	8	4	6	4	6	3	6	3	6	2
ESE	8	4	9	4	7	4	8	3	8	3	8	3
SE	12	5	12	5	12	5	11	4	12	4	11	3
SSE	16	6	13	6	12	5	13	4	12	4	8	4
S	13	6	14	7	12	6	9	6	9	5	9	3
SSW	7	7	7	7	8	6	7	9	6	8	-	
SW	6	7	8	9	7	8	6	10	-		6	9
WSW	5	7	-		5	10	5	11	-		6	12
W	5	8	-		-		-		-		6	14
WNW	-		-		-		-		-		-	
NW	-		-		-		-		-		-	
NNW	-		-		-		-		-		-	
# observations	1,118		1,080		1,106		1,190		1,012		914	
Average speed		6		5		6		6		5		6

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 5,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-	-	-	-	-	-	-	-	-	-	-	-
N	15	11	16	11	12	12	11	10	11	10	11	9
NNE	12	13	10	11	8	9	8	10	9	9	6	8
NE	-	-	5	6	-	-	-	-	-	-	-	-
ENE	-	-	-	-	-	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-	-	-	-
SE	-	-	-	-	5	6	-	-	8	6	5	6
SSE	-	-	-	-	5	6	5	7	6	7	6	7
S	-	-	5	8	7	7	9	8	10	8	9	8
SSW	8	11	7	9	7	12	10	11	9	9	10	10
SW	8	10	7	10	9	10	10	11	7	10	8	9
WSW	7	13	6	11	7	12	7	13	6	10	6	10
W	8	12	6	12	8	12	6	13	5	11	5	7
WNW	5	13	6	12	7	13	6	12	5	10	5	11
NW	6	8	6	9	5	10	-	-	-	-	6	8
NNW	8	8	8	8	6	9	6	10	6	9	8	8
# observations	1,067		869		982		967		1,048		1,069	
Average speed		10		9		10		10		9		8

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-	-	-	-	-	-	-	-	-	-	-	-
N	7	7	7	6	9	9	12	9	17	10	17	13
NNE	-	-	-	-	6	8	10	9	14	10	11	12
NE	-	-	-	-	-	-	5	6	5	5	-	-
ENE	-	-	-	-	-	-	-	-	-	-	-	-
E	-	-	-	-	-	-	5	6	-	-	-	-
ESE	6	6	6	6	6	7	6	5	-	-	-	-
SE	6	6	7	6	6	6	-	-	-	-	-	-
SSE	8	7	7	7	6	6	5	5	-	-	5	5
S	15	8	12	8	9	8	7	8	8	8	6	6
SSW	13	9	15	10	13	10	10	11	8	10	7	9
SW	11	9	14	10	11	10	9	11	6	12	6	11
WSW	7	10	7	8	7	11	7	11	6	11	7	13
W	5	8	5	7	6	9	5	12	-	-	9	13
WNW	-	-	-	-	-	-	-	-	5	10	5	17
NW	-	-	-	-	-	-	-	-	5	8	-	-
NNW	-	-	-	-	-	-	-	-	6	8	7	8
# observations	1,113		1,072		1,108		1,194		1,010		912	
Average speed		7		7		8		8		8		10

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 10,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Cal'm	0		-		0		0		-		-	
N	12	24	14	23	12	20	10	18	8	14	5	13
NNE	10	19	7	19	5	16	5	15	-		-	
NE	5	16	-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		5	10
ESE	-		-		-		-		-		5	9
SE	-		-		-		-		5	12	5	11
SSE	-		-		-		-		5	11	6	10
S	-		-		-		-		8	14	9	14
SSW	-		-		-		5	16	7	14	8	15
SW	8	27	8	20	8	23	9	19	9	19	8	16
WSW	8	26	10	23	10	22	12	23	9	17	12	16
W	13	24	9	17	13	24	12	21	8	19	10	13
WNW	14	25	11	19	12	22	11	19	10	17	8	14
NW	12	24	12	20	13	22	8	17	7	14	-	
NNW	9	18	10	18	10	18	9	16	5	13	-	
# observations	976		827		940		920		1,005		1,042	
Average speed		22		19		20		17		14		13

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		-		-		-		-		0	
N	-		-		-		7	14	12	21	11	20
NNE	-		-		-		8	16	9	21	10	21
NE	-		-		-		6	11	5	16	6	17
ENE	-		-		-		5	12	5	12	-	
E	-		5	8	5	10	-		-		-	
ESE	5	8	5	9	6	12	-		-		-	
SE	7	10	6	10	5	12	5	10	-		-	
SSE	9	9	9	10	6	12	-		-		-	
S	16	12	15	14	9	14	6	12	-		-	
SSW	15	14	16	16	12	17	8	17	5	15	-	
SW	16	14	18	16	15	19	6	18	6	22	6	24
WSW	11	14	12	15	12	21	10	19	8	20	8	24
W	5	11	-		9	15	9	18	10	22	13	27
WNW	-		-		-		8	17	10	21	12	28
NW	-		-		-		6	16	10	20	12	24
NNW	-		-		-		-		8	15	8	17
# observations	1,095		1,063		1,089		1,076		914		878	
Average speed		12		13		15		15		18		22

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 15,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		0		0	
N	8	31	10	32	5	23	7	25	-		-	
NNE	6	24	5	26	-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		-		-		-		-	
SSE	-		-		-		-		5	17	-	
S	-		-		-		-		7	17	7	20
SSW	-		-		-		-		7	21	9	22
SW	8	38	8	29	9	30	10	32	11	25	14	22
WSW	10	33	12	29	14	30	16	31	12	29	14	23
W	16	30	11	26	14	31	15	28	12	26	12	20
WNW	16	31	12	29	13	34	12	28	10	23	10	22
NW	13	33	12	27	17	31	11	23	12	24	6	22
NNW	10	30	16	28	14	28	12	26	8	25	5	20
# observations	715		649		794		800		811		873	
Average speed		30		27		29		27		22		20

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		0		0		-		0		-	
N	-		-		-		7	18	8	24	8	24
NNE	-		-		-		-		6	26	6	32
NE	-		-		-		-		5	18	-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	6	13	-		-		-		-		-	
SE	8	13	7	12	-		-		-		-	
SSE	10	12	7	13	5	17	-		-		-	
S	14	14	16	14	7	18	6	16	-		-	
SSW	19	18	17	18	12	20	9	21	5	22	-	
SW	16	16	20	20	15	23	9	23	8	34	8	31
WSW	9	17	10	18	12	23	11	25	13	32	10	34
W	5	13	5	15	10	19	10	25	9	27	12	30
WNW	-		-		8	18	8	22	11	28	14	40
NW	-		-		6	14	8	24	16	31	15	31
NNW	-		-		5	19	8	21	9	26	10	29
# observations	802		813		851		880		717		657	
Average speed		15		16		19		20		27		30

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 20,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		-		0		-	
N	8	34	7	36	5	28	5	28	5	29	-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		-		-		-		-	
SSE	-		-		-		-		-		-	
S	-		-		-		-		5	23	-	
SSW	-		-		-		-		6	31	9	30
SW	7	47	8	32	7	39	9	47	12	33	17	32
WSW	13	44	11	38	14	36	16	39	16	32	16	29
W	16	40	14	37	18	38	20	38	13	35	18	27
WNW	18	37	13	33	19	37	13	34	16	30	9	32
NW	11	33	16	33	12	40	12	31	12	29	7	29
NNW	13	37	15	39	12	38	12	33	6	38	-	
# observations	642		565		675		705		741		797	
Average speed		38		34		36		36		30		27

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		-		0		0		0		0	
N	-		-		-		5	23	9	33	8	27
NNE	-		-		-		-		5	32	-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	6	12	-		-		-		-		-	
SSE	7	13	5	12	-		-		-		-	
S	11	15	10	15	5	19	-		-		-	
SSW	16	20	14	21	9	24	8	28	-		-	
SW	21	20	22	24	17	26	12	28	9	40	7	40
WSW	11	19	16	22	14	27	12	32	12	40	10	36
W	8	16	8	20	14	26	10	28	12	32	13	40
WNW	-		6	16	9	24	10	27	13	32	16	41
NW	-		-		6	17	9	23	15	41	14	42
NNW	-		-		7	24	8	29	9	28	12	38
# observations	739		692		757		802		619		563	
Average speed		16		19		24		25		33		37

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 25,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	8	40	10	43	-		7	37	-		-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		0		-		-		-	
SSE	0		-		-		-		-		-	
S	-		-		-		-		-		-	
SSW	-		-		-		-		5	42	8	31
SW	7	41	7	38	8	46	12	46	14	37	19	38
WSW	13	49	15	45	13	50	14	47	16	38	17	34
W	16	44	13	47	20	45	19	42	16	37	18	35
WNW	18	45	17	46	19	48	15	40	19	40	10	38
NW	12	43	16	47	13	47	12	40	10	37	6	35
NNW	13	46	11	50	9	49	9	38	6	42	-	
# observations	419		432		563		545		630		640	
Average speed		43		44		45		41		37		32

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	-		-		-		5	30	8	41	8	41
NNE	-		-		-		5	23	5	30	6	41
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		-		-		-		-	
SSE	5	14	-		-		-		-		-	
S	9	16	5	20	-		-		-		-	
SSW	18	26	13	24	7	28	-		5	37	-	
SW	22	25	22	27	17	33	12	33	11	43	7	43
WSW	16	23	18	28	17	35	12	33	13	50	9	39
W	9	22	15	23	16	31	10	33	12	39	16	48
WNW	5	19	7	21	10	28	10	31	14	36	18	49
NW	-		-		7	27	11	29	13	48	10	53
NNW	-		-		6	26	9	34	12	39	12	46
# observations	596		575		546		602		496		428	
Average speed		21		23		30		30		40		43

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 30,600 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		-		0	
N	8	47	8	52	-		5	47	-		-	
NNE	5	39	-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		0		0		-		-		-	
SSE	-		-		0		-		-		-	
S	-		-		-		-		-		-	
SSW	-		-		-		-		6	32	6	33
SW	7	48	5	47	11	47	12	51	14	46	19	46
WSW	14	63	16	51	15	55	17	53	15	44	18	38
W	14	51	16	54	20	55	20	32	19	48	17	41
WNW	15	52	16	54	18	54	12	46	18	43	11	39
NW	16	52	15	50	13	47	14	45	8	50	6	37
NNW	12	48	11	57	8	54	9	44	7	40	5	38
# observations	361		377		427		436		476		504	
Average speed		50		50		50		48		42		37

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		0		0		0		0		0	
N	-		-		-		7	29	8	46	8	39
NNE	-		-		-		5	33	-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		-		-		-		-	
SSE	-		-		-		-		-		-	
S	8	25	6	23	-		-		-		-	
SSW	20	31	13	31	5	39	-		-		-	
SW	28	31	22	33	16	43	10	40	14	60	6	46
WSW	16	29	21	31	18	40	11	43	13	50	12	51
W	5	26	14	30	20	38	13	55	10	43	17	50
WNW	-		7	27	11	35	11	36	13	44	17	56
NW	-		-		5	32	10	32	14	48	13	54
NNW	-		-		7	32	9	35	12	49	10	52
# observations	482		437		413		460		382		334	
Average speed		27		28		38		35		47		47

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 35,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		-	
N	6	44	9	54	-		-		-		-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		0		-		-		-	
SSE	-		0		0		-		-		-	
S	-		0		-		-		-		-	
SSW	-		-		-		-		-		5	34
SW	6	66	6	56	7	52	11	65	14	52	18	56
WSW	15	60	13	61	17	61	21	56	23	49	23	46
W	17	57	19	61	24	59	21	56	20	50	19	47
WNW	14	59	18	64	22	58	14	51	14	50	10	44
NW	18	52	16	55	10	51	12	46	10	52	6	42
NNW	11	56	8	60	7	65	7	53	5	51	5	36
# observations	310		320		382		378		385		430	
Average speed		55		57		56		53		48		43

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		0		0		0		0		0	
N	-		-		-		6	35	7	53	8	50
NNE	-		-		-		5	34	-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		0		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		0		-	
SE	-		-		-		-		-		-	
SSE	-		-		-		-		0		-	
S	7	38	7	35	-		-		-		-	
SSW	22	37	15	35	-		5	42	-		-	
SW	30	38	23	39	16	51	9	46	13	61	-	
WSW	18	37	21	36	22	49	13	49	15	58	14	54
W	8	31	16	38	18	42	11	42	14	51	17	54
WNW	-		5	36	11	40	11	35	9	47	19	58
NW	-		-		7	36	14	34	18	55	11	57
NNW	-		-		5	35	8	45	13	53	9	54
# observations	421		394		347		384		329		290	
Average speed		34		35		44		38		53		50

- Less than 5

Contd.

TABLE 7. Contd.

Altitude: 40,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	5	42	-		-		-		-		-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		0		0		-		-		-	
ESE	-		-		-		-		0		-	
SE	-		0		0		0		0		-	
SSE	-		0		-		0		0		-	
S	-		0		0		-		-		-	
SSW	-		-		-		-		-		6	35
SW	-		-		-		13	57	11	52	20	60
WSW	16	60	16	59	22	56	19	55	28	53	24	48
W	23	56	24	59	28	59	26	55	21	46	19	47
WNW	20	57	24	65	23	59	16	53	19	49	12	42
NW	14	62	14	56	10	56	12	45	8	48	6	35
NNW	11	57	10	51	6	53	6	50	-		-	
# observations	289		285		344		321		351		378	
Average speed		56		57		56		52		49		46

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		-		-		6	39	7	49	8	41
NNE	-		0		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		0		-		-		-		-	
E	-		-		-		-		-		-	
ESE	-		-		-		-		-		-	
SE	-		-		-		-		-		-	
SSE	-		-		-		-		0		-	
S	8	38	8	37	-		-		-		-	
SSW	23	42	18	40	7	44	-		-		-	
SW	33	41	25	41	14	58	8	43	11	59	6	53
WSW	20	38	22	42	26	56	15	51	23	65	13	57
W	7	34	16	44	20	50	19	40	15	52	20	55
WNW	-		-		9	40	10	38	11	52	23	60
NW	-		-		7	38	13	37	17	56	11	53
NNW	-		-		5	32	8	47	6	49	10	46
# observations	366		346		319		346		283		261	
Average speed		38		40		48		39		54		52

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 45,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		-	
N	-		-		-		-		0		-	
NNE	-		-		-		-		0		0	
NE	0		0		0		0		-		-	
ENE	-		0		0		0		0		-	
E	-		0		0		0		0		-	
ESE	-		0		-		0		0		0	
SE	-		0		0		0		-		-	
SSE	0		0		0		0		0		0	
S	-		0		-		-		-		-	
SSW	0		0		-		0		-		-	
SW	-		-		-		11	44	14	45	20	48
WSW	19	54	13	54	20	52	30	49	32	42	28	43
W	27	51	32	54	38	56	28	48	30	43	24	44
WNW	20	50	25	54	23	52	18	46	15	42	11	34
NW	14	53	14	52	9	48	8	38	-		-	
NNW	9	51	8	39	-		-		-		-	
# observations	271		249		301		281		290		298	
Average speed		50		51		52		46		42		41

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	-		-		-		5	29	6	38	-	
NNE	-		0		-		-		-		-	
NE	0		-		-		-		-		-	
ENE	0		-		-		-		-		0	
E	-		-		-		-		0		0	
ESE	-		-		0		-		-		-	
SE	-		-		-		-		0		0	
SSE	-		-		-		-		-		0	
S	6	32	5	29	-		-		-		0	
SSW	21	39	16	36	-		-		-		-	
SW	38	37	26	39	17	47	7	42	6	62	7	45
WSW	21	34	24	36	28	52	17	44	28	59	15	56
W	8	29	16	39	21	45	20	40	20	46	23	46
WNW	-		5	30	9	37	17	37	16	46	24	52
NW	-		-		9	32	10	36	12	50	13	44
NNW	-		-		-		8	36	5	45	10	37
# observations	285		306		287		308		253		242	
Average speed		35		35		44		36		49		46

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 50,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	-		-		-		-		-		-	
NNE	-		-		0		-		0		-	
NE	-		0		0		-		0		0	
ENE	-		0		-		0		0		-	
E	0		0		0		0		0		-	
ESE	-		0		0		0		0		-	
SE	0		0		0		0		0		0	
SSE	0		0		0		0		0		-	
S	0		-		-		-		-		-	
SSW	0		-		-		-		-		6	30
SW	5	45	-		-		11	38	16	34	21	30
WSW	15	46	14	47	20	43	30	40	32	33	27	32
W	31	44	31	46	41	46	30	39	31	30	23	31
WNW	21	41	28	43	20	39	17	35	12	33	9	23
NW	12	44	13	41	8	39	6	31	-		-	
NNW	8	41	7	36	-		-		0		-	
# observations	260		243		293		272		275		291	
Average speed		42		43		42		37		32		28

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		0		0		0		0		0	
N	-		-		-		5	25	-		-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	0		-		-		-		-		-	
E	0		-		-		-		0		0	
ESE	-		-		-		-		-		0	
SE	-		-		-		-		0		0	
SSE	5	21	-		-		-		0		-	
S	11	17	9	19	-		-		-		-	
SSW	20	24	12	22	-		-		-		-	
SW	25	26	20	24	14	36	9	27	8	35	-	
WSW	18	24	25	30	26	39	16	42	25	48	18	44
W	8	19	12	24	24	32	23	32	18	38	24	38
WNW	-		8	22	13	31	18	28	22	38	19	44
NW	-		-		7	28	8	24	8	43	17	36
NNW	-		-		-		6	26	7	33	9	28
# observations	275		257		269		300		246		233	
Average speed		22		23		32		29		39		38

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 55,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		-		-	
N	-		5	24	-		-		0		-	
NNE	-		-		0		-		0		-	
NE	-		0		-		0		0		-	
ENE	-		0		-		0		0		-	
E	-		0		-		0		0		-	
ESE	0		0		0		0		0		-	
SE	0		-		0		-		-		-	
SSE	0		0		0		0		-		-	
S	0		0		0		-		-		5	13
SSW	0		-		-		-		7	17	15	17
SW	-		-		5	28	16	30	21	25	18	17
WSW	16	32	10	35	18	32	23	30	29	23	19	15
W	30	32	28	34	38	35	31	30	25	21	15	15
WNW	25	30	32	33	23	34	16	28	12	19	7	15
NW	12	26	13	30	8	26	8	25	-		-	
NNW	6	29	7	30	5	27	-		-		-	
# observations	232		222		270		259		243		251	
Average speed		30		33		32		29		22		14

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		0		0	
N	-		-		-		-		-		-	
NNE	-		-		-		-		-		-	
NE	-		-		-		-		-		-	
ENE	-		-		-		-		-		-	
E	-		-		-		-		-		0	
ESE	8	10	7	12	-		-		-		0	
SE	-		6	9	-		-		0		0	
SSE	14	11	9	11	-		-		-		0	
S	25	16	15	12	-		-		-		0	
SSW	16	14	12	14	10	16	-		-		-	
SW	9	13	14	13	13	18	10	22	6	35	5	22
WSW	-		13	13	20	21	19	25	21	33	16	31
W	5	13	6	13	15	21	17	25	21	29	21	33
WNW	-		-		15	17	14	21	20	28	29	31
NW	-		-		10	16	13	18	12	29	10	30
NNW	-		-		-		6	14	5	17	11	20
# observations	256		272		241		265		240		221	
Average speed		13		12		18		20		27		29

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 60,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		-		0		-		-		-	
N	7	16	8	20	-		-		-		-	
NNE	-		-		-		0		-		-	
NE	-		-		-		-		0		-	
ENE	-		0		-		-		-		6	9
E	-		0		-		-		-		9	10
ESE	0		0		0		-		-		7	10
SE	-		0		-		-		-		10	10
SSE	0		-		-		-		-		12	9
S	0		-		-		-		8	10	11	9
SSW	0		-		-		7	18	12	14	13	8
SW	-		-		5	19	18	22	20	15	7	9
WSW	11	30	11	25	12	22	26	21	19	13	-	
W	28	26	22	24	40	26	20	21	16	12	-	
WNW	21	25	29	24	23	24	10	18	8	9	-	
NW	16	20	14	22	6	19	5	16	-		-	
NNW	6	17	6	19	7	15	-		-		-	
# observations	223		211		264		251		231		245	
Average speed		23		23		22		19		12		9

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	-		0		0		0		0		0	
N	-		-		-		5	10	6	17	8	18
NNE	0		-		-		6	10	-		-	
NE	-		-		-		6	11	-		-	
ENE	6	12	10	8	7	8	5	10	-		-	
E	17	13	16	12	-		-		-		-	
ESE	24	14	23	11	6	10	-		-		-	
SE	27	13	10	11	-		-		-		0	
SSE	13	10	10	9	5	8	-		-		0	
S	-		6	10	8	10	-		-		-	
SSW	-		-		6	11	5	6	-		-	
SW	-		-		10	11	8	15	7	25	7	16
WSW	-		-		8	11	17	19	19	25	14	20
W	-		-		10	13	13	17	22	18	18	22
WNW	0		-		6	12	10	16	18	19	19	22
NW	0		-		12	9	11	13	12	21	16	21
NNW	0		-		5	10	8	11	-		9	17
# observations	247		260		223		252		229		219	
Average speed		12		10		10		14		19		19

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 65,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		-		-	
N	8	14	10	12	-		6	9	-		-	
NNE	7	12	6	15	-		-		-		-	
NE	7	15	5	16	-		-		6	7	-	
ENE	-		-		-		-		-		10	10
E	-		-		-		-		7	9	27	11
ESE	-		-		-		-		11	7	27	12
SE	-		-		-		-		6	8	15	10
SSE	-		-		-		-		10	8	9	8
S	-		-		-		-		8	7	-	
SSW	-		-		-		6	9	5	9	-	
SW	7	12	-		5	17	12	12	9	8	-	
WSW	8	27	5	20	16	21	17	15	6	8	-	
W	14	21	15	22	26	19	15	16	-		-	
WNW	17	24	23	18	13	17	11	11	-		-	
NW	9	15	12	14	10	14	-		5	7	-	
NNW	10	14	11	10	-		-		6	5	-	
# observations	215		203		249		237		229		244	
Average speed		18		16		16		12		7		10

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		-		-		-	
N	0		-		-		-		7	13	9	16
NNE	0		-		5	6	7	8	-		5	12
NE	-		-		5	9	9	9	5	14	5	12
ENE	10	16	13	12	9	9	10	11	-		-	
E	39	16	38	16	17	10	-		-		5	10
ESE	39	16	29	12	15	9	-		-		-	
SE	7	13	5	11	-		-		-		-	
SSE	-		-		-		-		-		-	
S	-		-		7	7	-		-		-	
SSW	-		-		7	7	-		0		-	
SW	0		-		5	7	8	12	5	13	5	11
WSW	0		-		-		13	14	15	19	10	16
W	0		-		5	9	11	11	18	19	11	13
WNW	-		-		-		10	13	16	18	16	20
NW	0		-		-		7	8	9	13	15	15
NNW	0		-		-		6	11	8	13	8	14
# observations	245		245		225		231		212		206	
Average speed		16		13		8		10		15		14

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 70,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		-		-		0	
N	8	12	9	10	-		-		-		-	
NNE	9	14	8	11	-		-		-		-	
NE	15	15	9	15	-		5	8	10	8	-	
ENE	11	16	9	13	7	9	5	8	13	9	13	15
E	8	12	6	12	8	14	8	10	20	10	48	16
ESE	-		-		6	10	6	8	15	9	25	15
SE	-		-		-		8	8	9	8	7	12
SSE	-		-		-		-		6	9	-	
S	-		-		-		-		-		-	
SSW	-		-		-		-		-		-	
SW	-		-		6	12	10	10	-		0	
WSW	6	27	5	27	12	19	12	14	-		-	
W	13	26	10	20	18	20	10	10	-		0	
WNW	12	20	9	16	11	20	7	10	-		0	
NW	6	19	8	14	6	14	6	8	-		-	
NNW	-		13	10	-		-		-		-	
# observations	206		194		233		228		219		223	
Average speed		17		13		14		9		8		14

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		0		0	
N	0		0		-		6	10	7	9	8	12
NNE	0		-		-		9	8	8	10	6	16
NE	-		-		8	10	6	10	-		11	17
ENE	8	20	14	15	16	10	12	10	9	12	8	11
E	61	21	54	17	22	12	5	7	6	14	6	10
ESE	27	19	24	15	17	10	6	8	-		-	
SE	-		-		6	12	-		-		-	
SSE	0		-		-		-		-		-	
S	0		-		-		5	4	-		-	
SSW	0		0		-		-		-		-	
SW	0		0		-		7	8	-		-	
WSW	0		0		-		9	13	7	14	7	13
W	0		-		-		8	9	19	18	11	18
WNW	0		-		-		6	9	14	16	11	16
NW	0		0		-		6	9	9	10	11	13
NNW	0		0		-		7	9	5	11	10	12
# observations	235		237		220		216		205		196	
Average speed		20		16		9		9		13		14

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 75,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		-		0		0		-		0	
N	5	11	8	10	-		-		-		0	
NNE	8	13	13	9	-		-		-		-	
NE	19	16	11	12	-		-		8	7	-	
ENE	19	18	13	16	12	14	13	10	17	10	16	16
E	10	17	11	17	16	13	14	10	28	12	53	18
ESE	-		6	19	6	14	9	13	17	11	26	17
SE	-		-		-		7	7	9	9	-	
SSE	-		-		-		-		-		0	
S	-		-		-		-		-		0	
SSW	-		-		-		5	9	-		0	
SW	-		-		-		7	11	-		0	
WSW	5	27	-		10	26	11	14	-		0	
W	11	30	8	17	13	18	8	13	-		0	
WNW	6	22	10	14	13	18	5	8	-		0	
NW	7	23	-		5	12	-		-		0	
NNW	-		-		-		-		-		0	
# observations	196		180		225		212		214		224	
Average speed		19		14		15		10		10		17

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		-		-	
N	0		0		-		5	6	8	9	7	10
NNE	0		0		-		6	7	7	10	10	19
NE	0		-		6	10	6	8	5	10	12	19
ENE	9	20	10	18	23	11	7	9	7	15	13	15
E	71	24	66	21	27	12	5	9	8	10	7	10
ESE	19	22	21	19	18	12	-		-		-	
SE	-		-		6	7	-		-		-	
SSE	-		-		-		-		-		-	
S	0		-		-		-		-		-	
SSW	0		0		-		-		-		-	
SW	0		0		-		8	8	-		-	
WSW	0		0		-		12	8	8	16	5	13
W	0		0		-		9	12	18	15	10	21
WNW	0		-		-		11	9	17	17	11	16
NW	0		0		-		7	9	6	15	6	16
NNW	0		0		-		7	7	5	17	6	11
# observations	227		227		212		206		193		186	
Average speed		24		20		10		8		13		15

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 80,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		-		0		-		0	
N	5	19	7	10	-		-		-		-	
NNE	5	13	6	7	-		-		-		0	
NE	14	19	10	14	-		-		5	10	-	
ENE	26	21	14	16	10	17	10	10	14	11	8	18
E	13	21	17	17	21	17	18	13	28	14	62	20
ESE	-		-		9	13	11	10	14	11	24	18
SE	-		-		-		-		8	10	-	
SSE	-		-		-		-		7	9	-	
S	-		-		-		-		-		0	
SSW	-		-		-		5	9	-		0	
SW	-		-		-		7	13	-		0	
WSW	-		-		10	26	10	19	-		0	
W	12	36	6	20	18	22	14	15	-		0	
WNW	7	23	10	20	8	17	5	11	-		0	
NW	-		6	10	-		-		-		0	
NNW	-		6	9	-		-		-		0	
# observations	190		171		205		202		210		211	
Average speed		22		14		17		12		10		19

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		-		-	
N	0		0		-		6	6	5	10	8	15
NNE	0		0		-		5	6	-		6	16
NE	0		0		5	10	-		8	13	17	18
ENE	8	24	5	19	19	12	7	8	6	12	9	19
E	78	27	77	23	33	14	-		6	14	8	13
ESE	13	26	16	22	19	12	-		-		-	
SE	-		-		5	7	-		-		-	
SSE	0		0		-		-		-		-	
S	0		0		-		-		-		-	
SSW	0		-		-		5	7	-		-	
SW	0		0		-		-		-		-	
WSW	0		0		-		8	11	9	22	-	
W	0		-		-		17	12	24	21	17	28
WNW	0		0		-		13	11	16	16	11	17
NW	0		0		-		12	8	-		5	14
NNW	0		0		-		-		8	12	5	17
# observations	216		215		196		197		183		174	
Average speed		26		23		12		9		15		18

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 85,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		-		-		-		-		-	
N	-		6	8	0		-		-		0	
NNE	7	17	-		-		-		-		-	
NE	14	23	10	13	-		-		-		-	
ENE	20	24	12	20	10	18	7	12	6	16	7	20
E	15	21	17	21	22	21	9	11	23	16	63	22
ESE	-		6	16	7	13	10	12	19	12	23	18
SE	-		-		-		-		-		-	
SSE	0		-		-		-		8	7	-	
S	0		-		-		9	6	-		0	
SSW	-		0		-		-		-		0	
SW	-		-		-		6	12	5	6	0	
WSW	5	41	8	18	13	27	15	17	9	9	0	
W	11	41	14	22	24	24	16	17	-		0	
WNW	7	25	11	18	7	17	5	11	-		0	
NW	5	27	-		5	8	-		-		0	
NNW	5	14	-		-		-		-		-	
# observations	173		161		186		185		199		192	
Average speed		25		16		20		12		11		20

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		-		0		0	
N	0		0		-		6	8	7	9	6	19
NNE	0		0		0		-		-		-	
NE	0		0		6	6	-		5	14	12	19
ENE	5	23	6	24	20	13	-		7	18	8	22
E	80	29	80	27	34	16	-		6	18	8	16
ESE	15	27	14	24	18	13	-		-		-	
SE	0		0		-		-		-		-	
SSE	0		0		-		-		-		-	
S	0		0		-		-		-		-	
SSW	0		0		-		6	7	0		-	
SW	0		0		-		8	9	-		-	
WSW	0		0		-		11	13	10	22	8	22
W	0		0		-		23	14	27	27	20	30
WNW	0		0		-		11	17	16	17	14	26
NW	0		0		0		5	9	8	15	-	
NNW	0		0		-		6	7	-		-	
# observations	200		204		188		187		173		155	
Average speed		29		26		13		11		19		21

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 90,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	-		-		-		-		-		0	
NNE	6	18	-		-		-		-		0	
NE	16	27	7	12	-		-		-		-	
ENE	19	26	18	22	10	19	-		10	12	8	19
E	13	24	15	25	20	22	6	13	19	17	68	22
ESE	-		5	20	9	18	9	12	15	13	17	19
SE	-		-		-		-		-		-	
SSE	0		-		-		-		6	7	-	
S	-		-		0		5	6	-		-	
SSW	-		-		-		-		7	8	0	
SW	-		-		-		11	14	7	9	0	
WSW	8	48	8	25	12	30	14	21	8	9	0	
W	11	39	16	27	24	28	25	21	-		0	
WNW	7	32	9	20	9	19	6	11	5	11	0	
NW	-		-		-		-		5	7	0	
NNW	5	20	-		-		-		-		-	
# observations	158		154		163		171		177		168	
Average speed		28		20		23		15		11		20

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		0		-		5	7	7	10	-	
NNE	0		0		-		-		-		6	24
NE	0		0		-		-		-		6	19
ENE	6	36	8	27	12	15	-		7	18	6	29
E	84	31	80	29	43	16	-		6	24	6	20
ESE	10	30	10	28	14	13	-		-		-	
SE	0		-		-		-		0		-	
SSE	0		0		-		-		0		-	
S	0		0		-		-		0		-	
SSW	0		0		-		-		-		-	
SW	0		0		5	7	8	15	0		-	
WSW	0		0		-		18	14	9	30	14	30
W	0		0		-		27	18	31	29	27	33
WNW	0		0		-		13	16	20	20	11	22
NW	0		0		0		7	12	8	12	-	
NNW	0		0		-		-		-		5	24
# observations	178		190		168		174		160		141	
Average speed		31		29		13		14		21		25

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 95,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	5	15	-		-		-		-		0	
NNE	5	20	-		-		-		-		-	
NE	19	30	7	15	-		-		-		-	
ENE	14	26	10	26	11	22	-		9	12	5	23
E	15	25	17	28	15	29	-		22	18	71	23
ESE	-		6	24	9	15	-		8	12	16	21
SE	-		-		-		5	6	6	10	-	
SSE	0		-		-		-		-		-	
S	0		-		0		-		-		-	
SSW	-		-		-		-		-		0	
SW	-		5	18	-		10	18	8	12	0	
WSW	9	59	7	24	14	41	25	22	14	14	0	
W	13	40	19	31	28	37	24	23	8	12	0	
WNW	7	29	8	17	9	28	8	12	6	10	0	
NW	-		-		-		-		-		-	
NNW	-		-		-		-		-		0	
# observations	138		136		148		157		163		148	
Average speed		30		22		28		17		13		22

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		-		0		0	
N	0		0		0		-		-		-	
NNE	0		0		-		-		5	15	5	31
NE	0		0		-		7	8	-		8	22
ENE	6	30	8	26	17	14	-		9	20	-	
E	80	33	76	31	30	19	-		-		-	
ESE	14	32	15	31	20	16	-		-		-	
SE	0		0		9	13	-		0		0	
SSE	0		0		-		-		-		0	
S	0		0		-		-		-		0	
SSW	0		0		-		-		0		0	
SW	0		0		-		6	15	0		-	
WSW	0		0		-		22	17	16	30	12	41
W	0		-		-		27	25	37	35	38	41
WNW	0		0		-		12	15	16	25	15	32
NW	0		0		-		-		-		6	15
NNW	0		0		-		-		-		-	
# observations	162		178		149		151		138		132	
Average speed		33		30		14		16		27		33

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 100,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		-		0		0	
N	-		-		-		0		-		0	
NNE	10	24	-		0		-		-		-	
NE	17	34	5	12	-		-		-		-	
ENE	13	27	15	22	8	26	-		7	14	12	22
E	11	22	10	39	18	27	-		16	20	54	26
ESE	-		-		8	22	-		11	16	30	23
SE	-		-		-		0		-		-	
SSE	0		-		-		-		-		0	
S	0		-		0		-		-		0	
SSW	-		-		-		5	8	-		-	
SW	-		-		-		10	20	9	12	0	
WSW	9	68	7	35	17	36	26	26	11	17	0	
W	17	46	22	34	35	43	26	26	15	12	0	
WNW	6	33	10	24	-		12	20	11	12	0	
NW	-		5	13	-		-		-		0	
NNW	-		7	9	-		-		-		0	
# observations	119		116		120		132		150		129	
Average speed		34		24		32		20		14		24

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		0		0		-		5	15	-	
NNE	0		0		-		0		-		5	24
NE	0		-		-		-		5	10	5	28
ENE	-		6	29	12	26	-		5	16	-	
E	85	36	73	32	24	18	-		-		-	
ESE	12	37	20	32	20	16	-		-		-	
SE	0		0		10	9	-		0		-	
SSE	0		0		5	10	-		0		0	
S	0		0		-		-		-		0	
SSW	0		0		-		-		0		0	
SW	0		0		-		7	15	0		-	
WSW	0		0		6	15	21	25	16	40	16	57
W	0		0		-		29	28	44	40	40	52
WNW	0		0		-		12	19	16	27	12	32
NW	0		0		-		6	13	-		7	20
NNW	0		0		-		-		-		-	
# observations	150		169		132		136		115		109	
Average speed		36		32		14		20		32		41

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 105,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	-		-		-		0		-		-	
NNE	14	31	-		-		-		-		0	
NE	11	35	7	17	6	16	0		5	8	-	
ENE	12	22	11	30	5	40	0		8	14	11	25
E	6	33	10	37	21	25	-		8	21	50	29
ESE	-		-		6	17	-		9	17	32	23
SE	0		-		0		0		5	11	-	
SSE	0		0		-		0		-		0	
S	0		-		0		-		5	12	0	
SSW	-		-		0		-		-		0	
SW	-		-		-		10	22	11	14	0	
WSW	10	70	13	32	14	49	35	32	15	16	-	
W	24	48	20	35	36	51	32	30	12	18	0	
WNW	-		9	20	5	19	11	20	9	14	0	
NW	-		6	16	0		-		-		0	
NNW	5	21	7	13	-		-		-		0	
# observations	95		98		92		111		130		97	
Average speed		38		26		38		27		14		25

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		-		-		0		-		6	21
NNE	0		0		-		0		-		-	
NE	0		0		-		-		-		6	20
ENE	-		7	27	-		0		-		-	
E	80	38	67	35	32	19	-		-		-	
ESE	17	37	24	30	14	16	-		-		0	
SE	0		-		5	10	-		0		0	
SSE	0		-		10	9	-		0		0	
S	0		0		8	8	-		0		0	
SSW	0		0		-		-		0		0	
SW	0		0		5	16	13	20	-		0	
WSW	0		0		-		26	31	13	53	21	77
W	0		0		-		32	33	54	47	44	54
WNW	0		0		-		10	16	11	27	9	38
NW	0		0		-		0		5	13	-	
NNW	0		0		0		-		-		-	
# observations	132		136		111		98		84		86	
Average speed		38		33		14		25		39		49

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 110,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	5	26	-		-		-		-		-	
NNE	8	39	-		0		0		0		-	
NE	7	38	-		0		0		-		-	
ENE	7	24	10	27	8	28	0		5	15	10	26
E	5	33	16	38	17	27	0		8	14	42	32
ESE	-		-		5	26	0		7	21	37	25
SE	-		-		0		0		6	13	5	17
SSE	0		-		0		0		-		-	
S	0		0		-		0		7	10	0	
SSW	-		-		-		0		-		0	
SW	-		5	27	5	70	10	20	15	14	0	
WSW	20	82	10	38	17	62	31	31	21	17	0	
W	21	66	18	43	36	57	46	35	10	18	0	
WNW	-		14	25	-		11	24	8	17	0	
NW	10	19	-		-		-		-		0	
NNW	5	25	-		0		0		0		0	
# observations	61		57		59		84		96		62	
Average speed		50		30		45		31		15		26

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		0		-		-		-		-	
NNE	0		0		0		-		-		-	
NE	0		-		-		-		0		0	
ENE	-		-		6	12	-		0		-	
E	74	40	60	35	25	19	0		0		-	
ESE	23	38	34	33	17	15	0		0		0	
SE	0		-		11	12	0		-		0	
SSE	0		-		-		-		0		0	
S	0		0		-		-		0		0	
SSW	0		0		16	10	-		0		0	
SW	0		0		9	15	11	22	-		-	
WSW	0		0		9	19	39	39	21	67	20	89
W	0		0		0		25	42	52	52	36	85
WNW	0		0		-		6	25	-		20	55
NW	0		0		0		-		7	14	7	22
NNW	0		0		0		-		7	23	-	
# observations	101		94		81		64		58		56	
Average speed		39		34		15		32		45		67

- Less than 5%

Contd.

TABLE 7. Contd.

Altitude: 115,000 ft

Direction	Jan		Feb		Mar		Apr		May		Jun	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	7	16	0		0		0		-		0	
NNE	7	36	10	21	0		0		0		0	
NE	0		-		8	12	0		-		0	
ENE	-		10	40	8	20	-		0		10	23
E	7	18	17	40	0		0		10	16	61	28
ESE	0		0		-		0		8	22	23	20
SE	0		-		-		0		6	14	-	
SSE	0		-		0		0		-		0	
S	0		0		0		0		-		0	
SSW	-		-		0		0		6	16	-	
SW	0		-		-		9	13	8	24	0	
WSW	21	106	7	54	16	56	32	30	17	18	0	
W	29	59	17	48	52	76	41	32	25	22	0	
WNW	-		10	30	-		15	29	6	12	0	
NW	11	34	7	16	0		0		-		0	
NNW	7	24	7	12	0		0		-		0	
# observations	28		30		25		34		52		31	
Average speed		55		32		55		29		18		25

Direction	Jul		Aug		Sep		Oct		Nov		Dec	
	%	K	%	K	%	K	%	K	%	K	%	K
Calm	0		0		0		0		0		0	
N	0		0		-		0		5	20	6	76
NNE	0		0		0		-		-		0	
NE	0		0		-		-		5	14	0	
ENE	-		-		6	20	-		0		0	
E	73	44	75	40	6	20	0		0		0	
ESE	24	44	21	35	19	19	0		0		0	
SE	0		0		14	20	0		0		0	
SSE	0		0		6	13	-		0		0	
S	0		0		8	13	0		0		0	
SSW	0		0		11	14	0		0		0	
SW	0		0		6	10	8	40	0		0	
WSW	0		0		17	18	35	38	24	35	23	91
W	0		0		-		35	58	43	64	47	92
WNW	0		0		0		8	20	5	18	18	68
NW	0		0		0		0		5	20	6	35
NNW	0		0		0		0		9	14	0	
# observations	59		47		36		26		21		17	
Average speed		43		38		17		39		42		83

- Less than 5%

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13. ABSTRACT		
<p>ABSTRACT. This report, which supersedes NOTS TP 3673, summarizes surface and upper-air climatological data taken at the Naval Weapons Center, China Lake, California, from 1946 through 1968.</p>		

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